THE TELEGRAPHIC JOURNAL AND

Electrical Review.

VOL. XI.—No. 258.

THE *BONA FIDES* OF ELECTRIC LIGHTING.

THE statements which have at intervals been so carefully and ingeniously propagated regarding the extraordinary efficiency of the Ferranti machine, although not taking so great an effect on the public mind as was doubtless anticipated, have produced a certain amount of uneasiness amongst the shareholders of the Anglo-American Brush Electric Light Corporation and its subsidiary companies, if we may judge by the circulars issued by the parent company and its offspring the South Eastern Brush. This, however, is not to be wondered at, and the directors of the Anglo-American Corporation are quite justified in using every endeavour to appease the natural alarm occasioned amongst those interested in the future of the Brush system.

It is perhaps only just to mention in the first place that the success which the Brush system has achieved is due in a great measure to the commercial abilities of Mr. Robert Hammond, the founder of the company called after his name, who at first was the sole agent for the Brush light, and if the Hammond Company can secure a better system, as it professes to have done, we do not know why anything should be said against such a proceeding.

In a former article we touched upon several points contained in the prospectus of the Ferranti system issued by the Hammond Company. At present, as far as we are aware, the only direct information obtainable regarding Ferranti's invention has to be sought for in the pages of the above-mentioned circular. We have recently had brought to our notice by a friend unconnected with any electric light company's interests a circumstance connected with the wording of this pamphlet which, although of importance, might easily be overlooked.

The circular commences thus :—

THE "FERRANTI" SYSTEM
OF
ELECTRIC LIGHTING.

SOLE AGENTS:
THE HAMMOND ELECTRIC LIGHT AND POWER SUPPLY COMPANY (LIMITED).

Advantages of the Electric Light.

During the last two years the electric light has become so familiar an object throughout this country, and the benefits arising from its use are now so generally acknowledged, that very little new information can be given under this head. The prominent position, however, taken by this company (the Hammond) in the erection of electric light apparatus enables us to speak with a considerable degree of authority upon the practical outcome of the trials made at the leading works in every branch of industry.

Then follow the names of places where electric lights to the number of over 550 have been installed, as we understand it, by the Hammond Company. In no case can we find it mentioned that these installations were on the Brush system, and therefore the obvious inference forced on the mind of the uninitiated reader is that all this applies to the Ferranti invention.

A correspondent in the last number of the ELECTRICAL REVIEW made some pertinent remarks concerning the share taken by the *Times* in bringing the Ferranti machine before the public, but we consider the omission of the name to which we have just called attention much more deserving of censure than anything which has been published in the columns of the leading daily paper.

It seems that statements misleading in a certain degree are common to all electric light companies, but we do not think that such circumstances in the majority of instances occur knowingly, but more because sufficient experimental data concerning the absolute capabilities of any given system is not forthcoming, and it is then necessary to theorise or draw upon the imagination as to what degree of efficiency may be at least hoped for. We agree with the directors of the Anglo-American Brush Electric Light Corporation, that it is premature to promulgate rash statements as to the capabilities of machines which have not yet been constructed—or at any rate but experimentally—and that we can only arrive at a definite conclusion on the efficiency of such apparatus when tests have been made which can be supported by independent and reliable evidence. In regard to this point, we hope that some day we may have independent and reliable testimony concerning the candle-power of a Brush lamp when a given horse-power is being expended.

We have only called attention to one fact in the pamphlet issued by the Hammond Company, but there are others deserving attention. Although we have thought fit to express ourselves as to the *bona fides* of, not so much the Ferranti system, as the manner in which the invention is brought forward, the "scare" occasioned has been of some service, for the Brush directors have come to the conclusion that the time has arrived for a general reduction of the prices of dynamo-electric machines and lamps. This in itself is not only an advantage to the public, but the Brush system will gain in the end. New inventions are not so much required as low prices for existing apparatus, and if a tendency towards reduction in this direction has been accomplished by the rumours regarding the Ferranti machine, then it may, *perhaps*, sometimes be excusable to work a little evil to perform a great good. We are glad to observe that the Anglo-American Brush Corporation is on the point of bringing forward dynamo-electric machines specially constructed for the purpose of lighting by incandescence. Up to the present we do not know of any thoroughly successful effort at electric lighting by means of the present Brush system with Lane-Fox lamps, for the difficulties attached to arranging a circuit combining arc and incandescence lamps are much greater than have to be encountered in the ordinary arrangement of lighting by incandescence.

To place the lamps in the positions required in a straggling place gives rise to a special difficulty which we shall bring before our readers in the course of the next week or two. This difficulty, we may add, will obtain equally with the Ferranti machine, if both arc and incandescence lamps are actuated by the current from the same machine.

THE DJEDDAH-SOUAKIN CABLE.

GENTLEMEN,—I beg to send you, enclosed herewith, my report on the electrical condition of the Submarine Telegraph Cable manufactured by you for the Telegraph Department of the Turkish Government, and which you have laid between Djeddah and Souakin in the Red Sea, during the month of August in the present year.

I remain, Gentlemen, your faithfully,

FRANK JACOB,
Chief Electrician.

Messrs. Siemens Brothers & Co. (Limited),
Telegraph Works, Woolwich, and
12, Queen Anne's Gate, London, S.W.
October 21st, 1882.

REPORT

On the electrical condition of the Submarine Telegraph Cable manufactured by Messrs. Siemens Brothers and Co. (Limited) for the Turkish Telegraph Department, and submerged by them between Djeddah and Souakin.

The core consists of a strand of 7 copper wires, weighing 107 lbs. per nautical mile, covered with six layers of gutta-percha, without alternate layers of compound, weighing 140 lbs. per nautical mile.

The cable was shipped on board the s.s. *Rochefort*, on July 24th, 1882. The following are the results of the tests then taken :—

Ship tank.	Length in nautical miles.	Conductor resistance in ohms.		Electrostatic capacity in microfarads.*		Dielectric resistance per nautical mile reduced to 75° Fahr. in megohms.					Temperature of cable, Fahr.
		Total observed.	Reduced to per n. m. at 75° Fahr.	Total.	per naut. mile.	1 min	2 min.	5 min.	5 min.	10 min.	
1	79·086	885·70	11·49	23·688	0·2996	3366	3866	4117	4405	4778	62° 5
2	19·791	216·35	11·30	6·212	0·3139	2035	2225	2297	2414	2574	59° 5
3	95·158	1067·32	11·51	28·822	0·3029	3328	3769	3980	4124	4317	62° 5
3	2·030	22·487	11·43	0·6050	0·2995	2895	3434	3691	3885	4343	62° 5
3	4·035	44·673	11·36	1·249	0·3025	3453	3861	4075	4659	5060	62° 5

The submergence of the cable was commenced from Djeddah on the night of the 22nd of August, and the shore-end landed at Souakin and the final splice made.

The following are the results of the electrical tests taken at Souakin, twelve hours after completion, on August 27th, 1882 :—

Length of cable : 187·660 nautical miles.

Conductor resistance : 2115 ohms, or 11·27 ohms per nautical mile. Mean temperature of the cable by comparison with the sum of the resistances measured at 75° = 66° Fahrenheit.

Electrostatic capacity : 56·18 microfarads, or ·2994 microfarads per nautical mile.

Dielectric resistance per nautical mile, as observed (in megohms) : 1st minute, 9,382 ; 2nd minute, 11,035 ; 5th minute, 15,013 ; 10th minute, 18,760.

The results were exactly the same with both positive and negative currents, and absolutely undisturbed by earth currents.

Dielectric resistance of 1st minute reduced to 75° Fahr., and a pressure of one atmosphere = 3,394 megohms per nautical mile.

The values calculated from the sum of those obtained at the works for each coil tested at 75° Fahr. are for the whole cable :

Conductor resistance	=	11·49 ohms per nautical mile.	
Electrostatic capacity	=	0·2984 microfarads	„
Dielectric resistance	=	2140 megohms	„

Twenty-four hours after completion the cable was tested by M. Emile Lacoine, the representative of the Ottoman Telegraph Department, with the results given below :

Length of cable .	=	187·660 nautical miles.		
Conductor resistance	=	11·32 ohms per nautical mile.		
Electrostatic capacity	=	0·2982 microfarads	„	„
Dielectric resistance	=	8563 megohms.	„	„
Do., reduced to 75° Fahr.	=	4932 megohms.	„	„
Mean temp. of the cable	=	68° Fahr.		

(*Signed*) FRANK JACOB,
Chief Electrician.

* The electrostatic capacities here, as in all tests, are measured by the "balance method;" the values in this case are slightly higher than their true values, owing to the self-induction of the cable as coiled in the tanks.

THE TELEGRAPH.

IN the *New York World* of October 11th we read that on the previous evening, "A banquet was given to Mr. John Pender, M.P., by the Executive Committee of the Western Union Telegraph Company, at Delmonico's Hotel. Dr. Norvin Green presided, supported by General Thomas F. Eckert. The invited guests were Mr. David Dudley Field, Mr. Russell Sage, Congressman Abram S. Hewitt, Judge John F. Dillon, Mr. Chauncey M. Depew, General Horace Porter, General Wager Swayne, General G. Winslow, Mr. Jay-Gould, Mr. Cyrus W. Field, Mr. Samuel Sloan, Mr. William Dowd, Mr. J. T. Terry, Mr. C. P. Huntington, Mr. John Van Horne, Mr. George I. Gould, Mr. R. M. Gallaway, Mr. A. L. Hopkins, Mr. G. Fitzgerald, and Mr. William D. Bishop. Mr. Pender occupied the seat on the right of the President. After dinner there was some general conversation, and Dr. Green proposed the guest of the evening."

Mr. Pender, in replying, made a very interesting speech, an abstract of which, derived from the above source, will be found below. Having dealt first with the statistics of the telegraph, he next, by inference, exalted *the honour of the responsibility* of those at the head of the telegraphs to an equality with that of the Presidentship of the United States. He then alluded to a reduction in "the expense of the system to the press, as to enable them to use it more largely than they have hitherto done." Can it be that the news, telegraphed from Philadelphia a few days later, had already reached the astute Chairman of the Direct United States Cable Company, to the effect that four influential American newspapers have subscribed the stock in the new Baltimore and Ohio Cable Company ? Afterwards he entered into comparisons of American and English telegraphy, and drew somewhat unfavourable conclusions so far as the Government monopoly of Great Britain is concerned ; but we will let his words speak for themselves, they run as follows :—

"Mr. Chairman and Gentlemen : My visit to America has been one of the greatest possible satisfaction to me and it is with great regret that I shall depart from among you. My impression on leaving America after having seen its vast resources, its energetic people, its daily development and the immense extent of territory which has yet to become productive, is that England ought of all things to be proud of America. The relations which now exist betwixt the old country and the new are simply those of two branches of the same family. Progress is apparent here even in a more eminent degree than in England, because here there is a larger field for enterprise. In that development England must largely participate, because it cannot fail to have the effect of increasing the trade betwixt the two countries. In speaking of the future of telegraphy, one cannot overlook the wonderful strides of commerce during the last fifty years. It has grown twelve times faster than population. It is made up of two unequal items, imports and exports. The trade of the world is at the present moment represented by £2,787,000,000, composing the two unequal items of imports and exports. All that large amount of commerce is more or less moved by the telegraph. There is not an operation of any magnitude that does not originate through the telegraph. The nineteenth century shows a remarkable increase in the number of people constituting the civilised nations of the earth. It has doubled in a single lifetime. In 1801 there were 192,000,000 of civilised people ; in 1880, 365,000,000. The population of the United States in 1800 was, according to the census, a little over that of Portugal, which has 5,000,000 inhabitants. The population of this country has sprung to 50,000,000. With that enormous growth and still onward movement of population, telegraphy will in all likelihood increase in a still greater ratio, the competition in trade at present being such that no man has a chance of success unless he uses the wires extensively. At the present moment I find that the length of the wires in America is about 400,000 miles, with a capital of some £16,000,000 sterling invested therein, and representing a yearly revenue of £1,420,000. The submarine cables now show a length of 70,928 miles, representing a capital of £28,000,000 sterling, or nearly three-fourths of the value

of the whole of the telegraph system of Europe, and yielding a yearly revenue of £3,000,000. All that submarine system has been created within the past twelve years. The total length of the wires of the world, including submarine cables, is 1,510,592 miles. Their estimated cost is £77,078,162, the estimated revenue being £12,580,481. I hold that this system of telegraphy, which has been so rapidly developed, has brought into connection with each other every centre of civilisation and commerce throughout the world. Its power is so vast in the various departments of politics, commerce, and literature, that those who preside over it are under a great responsibility for its honourable management; and as I have said on previous occasions, the responsibility of being at the head of the power which wields, and more or less conducts the commerce of the world, is a position which it is as enviable to occupy as even that of being President of the United States, great as that honour is (applause). I do not mean to say that the honour is greater than that conferred by the Presidentship, but I refer to the responsibility. In addition to the influence and power at present maintained by telegraphy, I hold it will be largely used in the future in promoting the good feeling which ought to exist between America and the mother country (applause). I would suggest that the press should take a more active part in that direction than they have hitherto done. I have been disappointed when I have taken up the American newspapers to see so little in them about the affairs of England. Seeing that the growth of commerce is so rapid I think the press should arrange matters so as to familiarise the people of America with what is doing in England. It will be my duty when I return to endeavour to get the English press to pursue the same course in regard to American news. I may say that I shall be glad to use the influence that I have in connection with submarine telegraphy to so reduce the expense of the system to the press as to enable them to use it more largely than they have hitherto done (applause). Let me make one remark here in regard to the enterprise of some of our English newspapers. During the war in Africa it was not unusual, nor has it been unusual during the late war in Egypt, for the penny press to expend very large sums upon telegraphy. I remember more than one occasion upon which the penny papers in London have paid as much as £500 for one telegram, showing that they consider it so important to send full and early news that they disregard entirely the expenditure it may entail.

"I have desired above all things in my visit to America to impress upon those in charge of this great power the importance of their trust. There is no system of telegraphy that I have ever seen which is conducted in a more thorough manner, and more with a view to meet all public requirements than that of the Western Union (applause). I may say that it is omnipresent in America. I have found it in the most remote places. I have found it even on the Indian reservations, and there is in every corner of the country evidence that the company is alive to the importance of meeting the demands made upon them by all classes. When I look to the vast territory which their system has developed, and the enormous increase in telegraphy which must arise from that development, I can only congratulate the Western Union upon the position which they occupy, and those who conduct it, for the manner in which they are carrying out their operations (loud applause). As to the treatment which has been accorded me, let me say that I have found those at the head of the telegraph system vying with one another to make my journey pleasant and my path smooth. I have found your telegraph system so thorough that I have been enabled to conduct my business in England almost as easily as if I had been sitting in my office in Old Broad Street, London. As to the different systems of the two countries, that of England is in the hands of the Government, while that of America is controlled by private companies. I must confess that I am not altogether satisfied with the progress that has been made in our system in the ten years during which our system has been in the hands of the Government. We have not had the same scientific development; we have not had the same reduction in rates, or the same extension of system. In short, I do not consider that the Government—that the English Government—have given the facilities to the English people that the Western Union have given to the people of America during that period of ten years. I should, therefore, regret to see that enterprise, which is so energetically carried on, withdrawn from the control of private individuals (loud applause).

GORDON'S ALTERNATING CURRENT MACHINE.

When writing on the subject of this machine last week we omitted certain particulars with which Mr. Gordon had favoured us, thinking that a little extra consideration of the subject would be advisable. We expressed our doubts as to the accuracy of the results obtained by the inventor and his co-workers concerning the efficiency of the machine, which, apparently, gave back in the lamps 94 to 98 per cent. of the indicated horse-power. The following figures of the best result obtained were given to us by Mr. Gordon, who says that the limit of error in taking the indicator diagrams may probably be 5 or 6 per cent. It was found that the steam-engine—which we mentioned as having been employed on board the cable ship *Calabria* for "picking up" operations—when running at 140 revolutions per minute (present normal speed of dynamo-electric machine), and being entirely disconnected from the machine, showed 15 indicated horse-power. When coupled up to the machine, and running at the same speed, with 1,312 lamps in circuit, the engine indicated 143 horse-power (the mean of several diagrams varied from 140 to 147 indicated horse-power). The two Bürgin machines used as exciters are worked, as we have already noted, by a separate engine, and are said to absorb 6 horse-power. Our readers are also aware that Mr. Gordon's tests of the Swan lamps at 21 candle-power give an expenditure of ·1 horse-power absorbed in each lamp. He therefore assumes from these tests, and the observations regularly going on in the photometer room, that the 1,312 lamps represent an electrical horse-power of 131·2, and calculates his efficiency as follows:—Horse-power used in producing the current, 143 — 15 + 6 = 134 horse-power, efficiency then equals $\frac{131{\cdot}2}{134}$ = 98 per cent. in the lamps.

In the first place looking at the figures only, we allow that Mr. Gordon is quite justified in subtracting the 15 horse-power indicated by the engine when running free, but he is not right in adding on 6 horse-power for the exciting machines. This does not come into the question, because it is absorbed in the work indicated by the engine driving the large machine. For instance, if we suppose that the electro-magnets of Gordon's machine, which are excited by the current produced by the expenditure of 6 horse-power in the Bürgin machines, could be replaced by permanent magnets of the same strength, then the engine still indicates 143 horse-power to keep 1,312 lamps alight, but we lose sight of the 6 horse-power altogether. Therefore this item should not be brought into the calculation at all.

The horse-power will then be 143 — 15 = 128, and the efficiency $\frac{131{\cdot}2}{128}$ = more than 100 per cent., which is absurd.

Besides the error we have here pointed out, it is more than probable that in many of the Swan lamps the energy expended did not amount to more than half that which Mr. Gordon assumes; and if, as on the occasion of our visit, some of them were actually out, the assumed electrical power of 131·2 expended in the lamps may in reality not be more than 100. No account is taken of the conductors, which, however low their resistance may be, must bear some proportion to the resistance of 1,312 lamps arranged as we described last week. If we take the resistance of two of these lamps in series between the conductors as approximately 80 ohms when at 21 candle-power, then the total lamp resistance (656 sets of 2) will be roughly ·12 ohms, or exclusive of the conductors, about 15 times greater than the internal resistance of the machine.

It will be clearly seen, therefore, that no correct estimate of the efficiency of Gordon's machine can be arrived at until a series of careful tests have been made by several observers. We must, in justice to the inventor, state that he does not

suppose the figures given to us to be mathematically accurate, but he claims that the efficiency of his machine is so high that the difference between it and an ideally perfect machine is nearly covered by the ordinary errors of observation. We may add that the indicator diagrams were taken, quite irrespective of Mr. Gordon's experiments, by the engineers of the Telegraph Construction and Maintenance Company.

ADDYMAN'S FRICTION CLUTCH.

In the description of the Electric Launch which appeared in our issue of October 14th, we made mention of an application of Addyman's Friction Clutch, for throwing in or out of gear either of the two electro-motors used for propelling the vessel. This invention should be of great service to all engineers engaged in putting up the electric light, and, in fact, wherever dynamo-electric machines are employed. The principle of the apparatus is shown in figs. 1 and 2.

The power is exerted by the insertion of the wedge, A, opening out the levers, B B, and thereby expanding the friction ring, C, which grips the shell, D, over its whole surface. This shell runs loose on the shaft when the wedge is withdrawn.

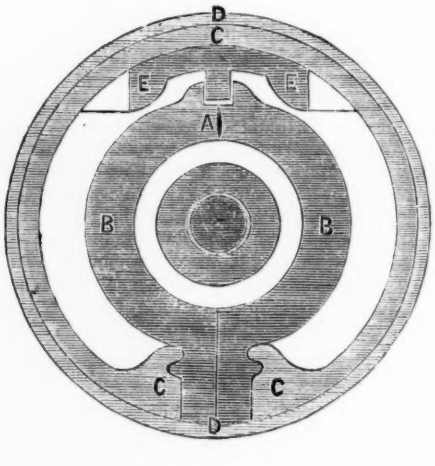

Fig. 2.

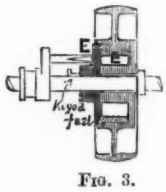

Fig. 3.

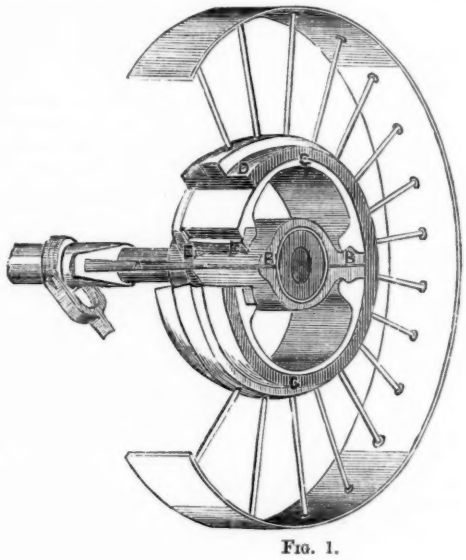

Fig. 1.

The lever actuating the wedge may be worked by hand or by a wheel and screw. When frequent disconnection is required, a simple lever attached to the wedge is all that is necessary.

Fig. 3 shows an arrangement for utilising old pulleys. E E acts as a crank pin to drive the ring C. Fast and loose pulleys which have hitherto been indispensable are now no longer required. Other methods have been devised for accomplishing that which the Addyman Clutch is apparently the best adapted for, but most of them appear to have been defective in their action. Some of the more important engineering periodicals have spoken very favourably as to the merits of Addyman's apparatus, and as far as we have had the opportunity of judging it acts admirably. The manufacturers are Messrs. J. Bagshaw and Sons, of the Victoria Foundry, Batley, Yorkshire, and the clutch has already found its way into the factories of many eminent firms. We understand that the invention has been applied in America for the last ten years, and although it has been known in England for some time past, it has not apparently been prominently brought forward till quite recently.

We are pleased to bring it before the notice of electricians, to whom it might not possibly appear through the ordinary channels of giving publicity to mechanical novelties.

Apropos of the Electric Launch, we may say that Mr. Reckenzaun, the engineer to the Electrical Power Storage Company, is of the opinion that Addyman's friction clutch deserves all that has been said in its favour, and that for electrical work, where the transmission of power through shafts is intermittent, he recommends the apparatus with every confidence.

SPRATT'S ELECTRICAL SIGNALLING APPARATUS FOR COMMUNICATING OUTBREAK OF FIRE.

The systems which have hitherto been in use for signalling to a fire station a notice of the outbreak of a fire in the neighbourhood of a signal post have been generally of one description. The arrangement of the apparatus has been such that the signal given has merely indicated from what post the alarm has been sent, but no means have been provided for enabling any details of the nature or exact locality of the outbreak to be indicated. In Mr. Spratt's system, not only is the usual signalling arrangement provided, but means is also given to the individual who gives the alarm of telegraphing any particulars that may be considered advisable. If the invention of Mr. Spratt consisted merely in the addition of a telegraphing instrument to the ordinary apparatus the idea would hardly be worthy of notice, but the inventor has so arranged all the parts that the ordinary signal and also the telegraphing are both done by the same instrument, so that complication and multiplicity of pieces are avoided. The arrangement of the circuit is such that one battery only is required for any number of signalling posts, whilst means are provided for testing the condition of the wire whenever considered desirable.

The general principle of the whole system is as follows :— At the fire station there is a receiving instrument of the step-by-step type, and at each of the posts there is a step-by-step transmitter. The battery is at the station, and the line-wires pass from there to the nearest post, thence to the next, and so on. In the receiving instrument there is an electro-magnet which, each time that the current is completed at either of the posts, attracts its armature. The armature works an escapement, controlling an escapement wheel. The escapement wheel has an index fixed upon its axis, and the reciprocating motion of the armature causes the index to pass around the dial. The dial is marked with the letters of the alphabet, and some other signs, and on an outer circle with the names of the several posts or places. A key is provided for setting the index to zero ; it operates mechanically by causing a lever to press upon a cam on the same axis with the index.

The first movement of the armature, by shifting a small finger or lever, closes a local circuit in which a bell is included, and the bell sounds. The zero key also acts on

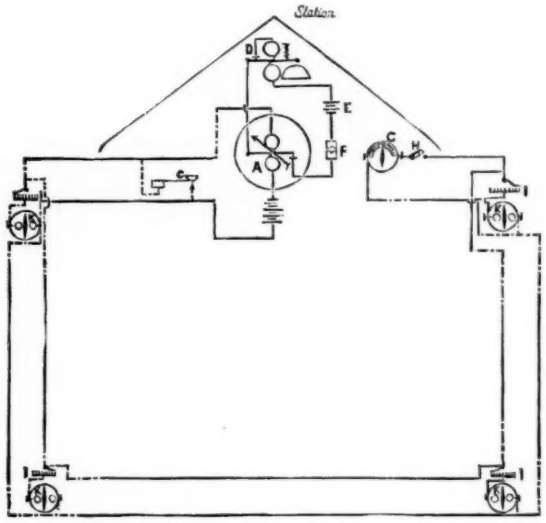

Fig. 1.

this finger to open the circuit at the same time that the index is set. There is also a plug circuit closed in the local bell circuit, and the bell can be silenced when desired by withdrawing the plug. The battery which works the whole system is, as already stated, at the central station, and here also a finger-key is provided which, when depressed, closes the circuit at the station, and takes the battery off the line, and so, as will be explained, indications can be given to the operator at the post.

The transmitting instrument at each post consists of a revolving contact-maker with the proper number of contacts to correspond with the receiving instrument; so that a complete revolution of the transmitting handle, or wheel, produces a complete revolution of the index on the dial. Each contact made by the transmitting instrument closes the circuit momentarily, the circuit normally (or when the instrument is at rest) being open.

This revolving contact-maker is so arranged that it can either be turned by hand from letter to letter, or it can be actuated by the pulling out of a stop, which causes the contact-maker to revolve the distance required to move the index at the receiving station until it points to the name of the post which signals. Thus the operator at the central station knows where the fire call comes from.

For verbal communication the contact-maker is moved round by hand, step by step, to the letters it is desired to transmit.

In one position in which the contact-maker can be placed, the circuit is closed through a galvanometer, the needle of which consequently deflects.

At the same time the position of the index at the station will show to the operator there that he can communicate with the post, which he does by depressing his key.

Each time that he does this the galvanometer needle will fall back, there being then no current on the line or through the galvanometer coils. In this way any prearranged signs may be given, and information, if necessary, conveyed by the Morse code.

Fig. 1 shows the general arrangement and combination of the apparatus for connecting a district with a fire station.

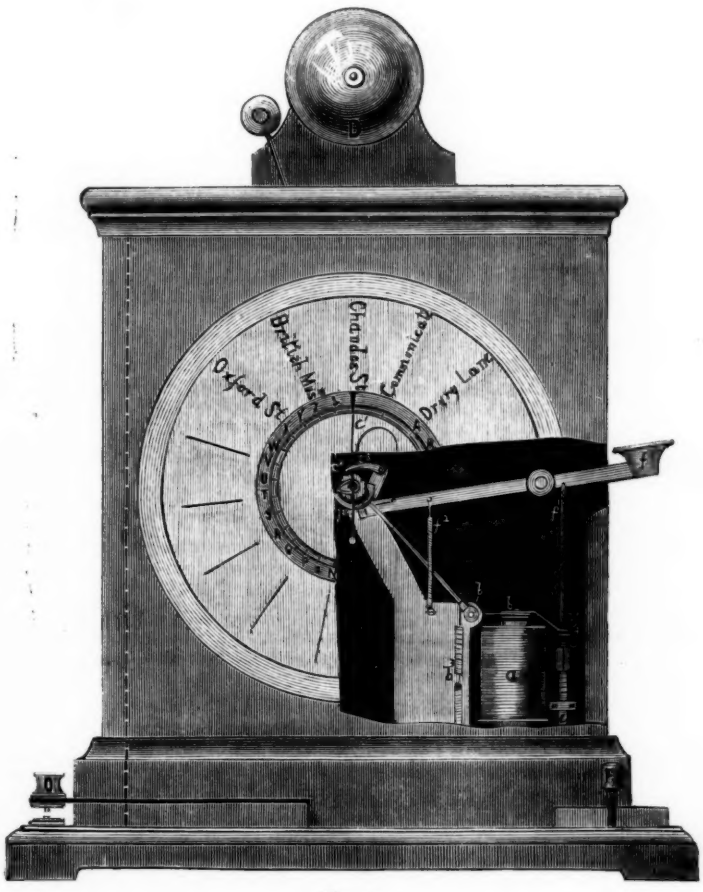

Fig. 2.

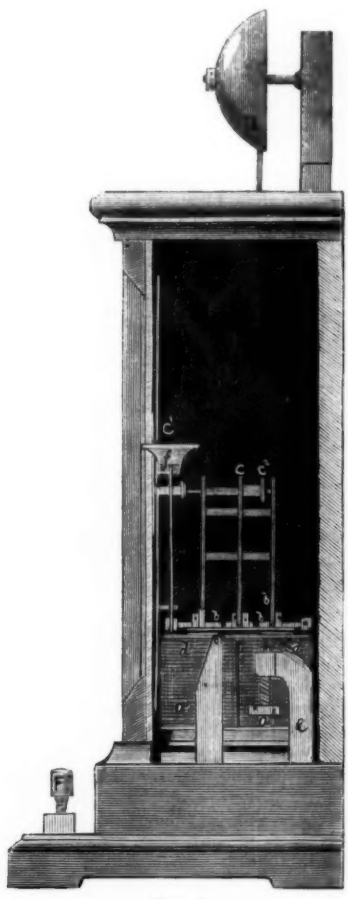

Fig. 3.

The instruments at the station are indicated, also those at four outlying posts.

Fig. 2 is a front elevation, partly in section of the step-

by-step receiver at the station. Fig. 3 is a side elevation, also partly in section of the same.

Fig. 4 is an elevation, partly in section of the instrument at a call post. Fig. 5 is a plan of the same.

In fig. 1 A is the step-by-step receiver, B the main battery, C the short-circuiting key, D the bell in a local circuit, E the bell battery, and F the plug socket. At the station there is also a testing galvanometer, G, and a switch, H.

At each post there is a rotary circuit-closer, *i*, which in a complete revolution carries the index of the step-by-step receiver completely around the dial.

The current from the main battery when the circuit is closed passes through the coils of the electro-magnet in the receiver, out to the posts, and back from any post at which the circuit is closed, to the battery. The circuit can also,

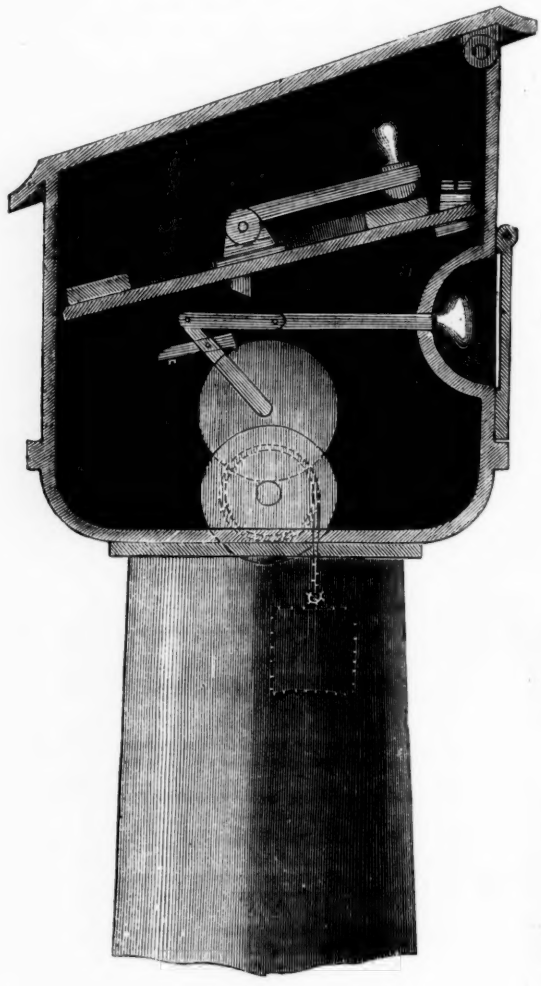

Fig. 4.

when desired, be closed in the station by the switch, H, and then the deflection of the galvanometer, G, will show that the circuit is complete throughout. When the circuit is completed at either post the operator at the station can nevertheless take the battery off the external part of the circuit by depressing the key, C; this he does for the purpose of communicating with the post in the manner to be described.

The local bell circuit is normally open, but it is completed by the first movement of the index of the receiver and remains complete until the index is replaced by the attendant. The bell can be silenced by removing the plug at F; this is necessary when communicating from the station to a post.

In figs. 2 and 3 *a* is the electro-magnet of the step-by-step receiver and *b* its armature. The armature, *b*, is carried upon the shorter arm of a lever pivoted at b^1; the longer arm of the same lever carries an anchor, b^2, which, during the to-and-fro movements of the armature resulting from the attraction of the magnet and the reaction of the spring, b^3, serves to propel the ratchet-wheel, *c*. The wheel, *c*, has as many teeth as there are signs upon the dial around which it carries the index, c^1, this index being mounted upon the axis of the wheel. To give greater certainty to the movement a ratchet-wheel, c^2, is provided on the same axis. This wheel has double the number of teeth of *c*, and with it the light spring pawl, c^3, engages. $b^\times$ is a projection from the armature-lever which, when the armature is attracted, comes down upon the light lever, *d*, and causes it to make contact with the point, *e*. The bell circuit is then completed, through the standard, d^1, upon which the lever, *d*, is carried, through the pivot, d^2, of the lever, through the point, *e*, and through the standard, e^1, which carries the contact point.

f is a finger key which has two duties to perform, viz., to set the index, c^1, to the zero mark, and simultaneously to sever the contact between the parts *d* and *e*. It effects the latter by means of the stem, f^1, which, when the key is depressed, strikes upon the lever, *d*, and raises the end of it, by which contact is made. d^1 is a small insulated spring, serving to retain the lever, *d*, in either of the positions which it has to assume. f^2 is a spring for returning the finger key, *f*, when it is released. The index, c^1, is brought to the zero mark by the following means:—it is not fixed upon the axis of the wheel, *c*, but is carried upon a tube, which em-

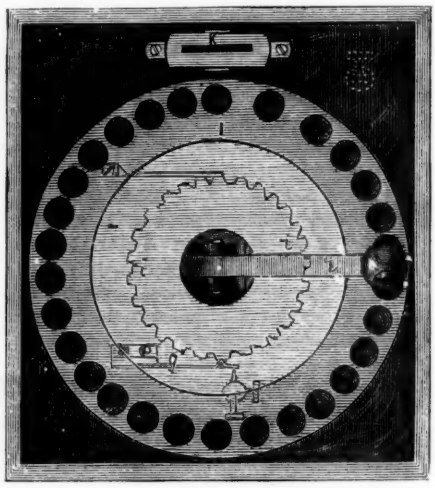

Fig. 5.

braces the axis firmly. Upon the tube there is also fixed the heart-shaped cam, $c^\times$, which the end of the key lever is just able to pass when the cam is in the position indicated in fig. 2; in all other positions the key lever, when depressed, thrusts the cam round until it assumes this, the zero position.

In these figures the short-circuiting key, C, the bell, D, and the plug socket, F, are also seen. In fig. 4, *g* is an insulated spring, with which the line-wire is connected, and *i* is a rotary contact making cam in connection with the return wire. The contact cam, *i*, can be turned round by means of the jointed handle, i^1, or, as will be seen, it can be rotated by withdrawing a draw knob, *o*. The projections on the cam, in passing the contact spring, touch it, and for each projection a current passes in the line-wire, causing the index of the receiver at the station to move a step. The handle, i^1, has a hemispherical projection on the under side, and there are holes of a like form arranged in a circle around the handle; these holes each correspond to a letter or sign, and to indicate this letter or sign on the dial of the receiver the handle is brought to the hole, and depressed so that the projection may enter; thus it is insured that the handle is brought accurately to the proper place. In all these positions, excepting one, the projections of the cam are out of contact with the spring, *g*. The remaining position is that to which the operator sets the handle when he desires to communicate.

The main circuit is then closed through the contact cam, *i*, the spring, *g*, and the coils of the needle indicator, K, the needle, K, is consequently deflected, but it falls back when-

ever the operator at the station puts down the key, C, for the battery is then taken off from the line. Thus communication is made from the station to the post. The coils of the needle indicators, K, are so wound that at whichever post the circuit may be closed, the resistance to be worked through may be approximately the same; this is effected by giving a higher resistance to the indicators which are near to the station than to those which are more distant, in such proportion as to compensate for the difference in the lengths of the line-wires.

The pull, *o*, when drawn out operates upon a pawl lever, and this engages with a wheel with a notch in its periphery. When the pull is withdrawn to its full extent the tail of the pawl strikes against a stop, and causes the withdrawal of the pawl from the notch. The axis of the wheel is geared to a wheel and pinion with the axis of the barrel on which the cord, *l*, is wound. Each operation of the pull winds the cord around the barrel, and when the release of the pawl takes place, the weight runs down and causes the barrel to revolve back. The barrel is geared with the contact cam, *i* (which is connected to the handle, i^1), by means of a ratchet wheel, so that *i* is only turned when the barrel rotates back under the influence of the weight. By giving a different angular movement to the cam, *i*, at each post, the number of contacts which will be transmitted can be varied so that the indication of the step-by-step-indicator will show from which post the signal has been transmitted.

Although the arrangement described works on the open circuit system, Mr. Spratt has arranged so that it can be made, if desired, to operate on the closed circuit principle. As is well known, there is a very general opinion that for alarm systems the closed circuit principle is decidedly preferable to the open circuit one; we are rather inclined to think that this opinion is somewhat too strongly insisted upon, but nevertheless, as it must have considerable weight, any new alarm system brought out at the present time would have a much better chance of success if it worked in accordance with the general idea of what is the correct method.

OBITUARY.

We regret to have to announce the death, at the comparatively early age of fifty, of Mr. Joseph Christopher Laws, which occurred at Brighton on the 26th ult.

Born May 31st, 1832, at Brighton, and educated at Lancing College, he was apprenticed to a watchmaker in his native town, where he learned that which assisted him so much in after years, viz., practical mechanics.

He came to London as assistant to Mr. Whitehouse in 1854, and was engaged in the laying of the first Atlantic cable in 1858. In 1859 he entered the service of Messrs. Gisborne and Forde, the engineers for the Malta and Alexandria cable. His next engagement was with Messrs. Bright and Clark, assisting in the manufacture and laying of the Persian Gulf cables; and from this service he entered that of Messrs. Clark and Forde, during which time he was engaged on cable expeditions in various parts of the world.

In 1869 he was employed by the Telegraph Construction and Maintenance Company to assist Mr. Willoughby Smith in the electrical department on board the *Great Eastern* whilst submerging the French Atlantic cable between Brest and St. Pierre, and he remained in the company's service till the day of his death. During this time he was in charge of the electrical department on board ship throughout the laying of most of the cables manufactured and laid by the company. For the last two years he held the post of head of the electrical staff at the Greenwich Works. Mr. Laws was one of the early members of the Society of Telegraph Engineers.

He was interred in Highgate Cemetery on 31st ult., and the large number of friends who assembled to pay the last tribute to his memory gave evidence of the great esteem and regard in which he was held not only by those who were fortunate enough to be intimately acquainted with him, but also by those who had the pleasure of being associated with him in business. His disposition was of a retiring nature; and had he been a pushing man like some of his contemporaries he would doubtless have stood before the world in a more exalted position than he did. He was a most conscientious and painstaking worker, and probably there is but one other electrician living with a like knowledge of all matters appertaining to submarine cable manufacture and laying, to that possessed by Mr. Laws.

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer, not necessarily for publication, but as a guarantee of good faith.

Letters, &c., for the "Correspondence" columns should arrive not later than Tuesday morning if they are desired to appear in the following number, such communications to be addressed to the "Editors," Electrical Review, 22, Paternoster Row, London, E.C.

Letters respecting Advertisements, Subscriptions, &c., should be sent to the "Publisher," Electrical Review, at above address.

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CORRESPONDENCE.

RE JOHN FULLER AND SONS' NEW PRICE LIST, PAGES 22 AND 33-4.

To the Editors of The Electrical Review.

Sirs,—Daniell has a potential of 1·14 volts, Bichromate has a potential of 2·08 volts (ratio as 1 : 1·82).

10 Daniells have a potential of $1{\cdot}14 \times 10 =$ 11·4 volts $\therefore \frac{11{\cdot}4}{2{\cdot}08} =$ say, 5·4 instead of 3

$\therefore$ to equal 10 Daniells 5·4 bichromates are needed. $5{\cdot}4 \times \frac{15}{3}$ shillings = ... £1 7 0

20 per cent. for coloured statement, say— 0 5 0

£1 12 0

While 10 Daniells, as per coloured statement for trade purposes £1 2 4

So that the cost of bichromate without cells or carbon plates, less cost of Daniell as against bichromate = ... 0 9 8

As to pages 33 and 34 of the price list, Mr. (afterwards Sir) Wm. Fothergill Cooke used, for many years before and after 1847, sulphate batteries on the Blackwall Railway to work the telegraphic communication between the engine houses, and this was virtually block signalling. The batteries were made of copper plates in parchment cells filled with sulphate of copper, the zincs being in water. Troughs were made of teak wood divided by slate partitions, and the whole coated with marine glue. The inventor of the gravity battery was Mr. Varley.

JAMES B. SPURGE.

Romford, *October 25th*, 1882.

[We have not yet had the pleasure of perusing the price list mentioned by our correspondent.—Eds. Elec. Rev.]

INDUCTION.

To the Editors of THE ELECTRICAL REVIEW.

DEAR SIRS,—In the *English Mechanic* of November and December, 1879, I pointed out and described the phenomenon known as double induction; I also stated there that double induction takes place in almost all electro-dynamic machines, both when used as generators and as motors, the phenomenon is, however, most marked in the Weston electroplating dynamo, the De Méritens and Gramme alternate current machine.

I don't know if any one observed this interesting effect previous to my experiments in 1879. I may at some future time detail these experiments and give their results, some of which are quite inexplicable under any of the crude theories as yet advanced to explain the action of armatures under induction in electro-dynamic machines.

I am yours,

RANKIN KENNEDY.

Glasgow, *October 30th*, 1882.

THE HEATING EFFECTS OF ELECTRICITY.

To the Editors of THE ELECTRICAL REVIEW.

DEAR SIRS,—Certain notions have presented themselves to my mind regarding the cause of the diminution of currents of electricity, on account of the resistance which this effect encounters in its passage. I send these ideas to you in the hope that they may possess sufficient novelty to warrant their publication through your valuable medium.

It is well known that friction produces heat in a greater or smaller degree, according as the motion of bodies is rapid or slow; and that the greater the resistance offered to a force, the greater will be the friction.

It is also generally known that heat always exists during the flow of an electric current, in a greater or smaller degree, and in a like manner that there are no perfect conductors, *i.e.*, all conductors offer a certain amount of resistance to the flow of the current.

Now suppose a current to be flowing along a conductor of small resistance. The resistance to the passage of the current being slight, the friction (*i.e.*, the power exerted by a certain force in overcoming another force) would be small, and there would likewise be little heating effect.

Again, suppose a current of the same dimensions to flow along a conductor of great resistance. The resistance, or force to be overcome by the current, being greater, the friction is also greater, and in like manner the heating effect is more perceptible; but the strength of the current will be found to be considerably less than in the previous instance.

Does not energy, imparted to a body, always expend its force in some form or other? Also, does not the current always decrease in quantity by its flow along a conductor, in a greater or smaller degree?

Therefore, I conclude that the decrease in the strength of the current of electricity, due to the friction in encountering the resistance offered by the conductor, is due to the fact that the missing portion of the current has, by reason of friction, expended itself along the conductor in the form of heat.

Apologising for taking up so much of your space,

I remain, dear Sirs, faithfully yours,

F. W. F.

[We insert our correspondent's letter as it apparently shows an inquiring spirit, but he evidently has not studied the subject deeply, or he would know that he has advanced nothing new.—EDS. ELEC. REV.]

ELECTRIC LIGHTING.

To the Editors of THE ELECTRICAL REVIEW.

SIRS,—As your columns are open to all matters connected with electric lighting, I take the liberty of giving you an explanation of the state of affairs at St. Enoch station, Glasgow, which, I believe, was the first railway station lighted by electricity in Great Britain.

Some three years ago—acting for the British Electric Light Company—I succeeded in inducing the directors of the Glasgow and South Western Railway Company to adopt electric lighting, and, as they had an engine on the premises, constructed for driving the machinery of the laundry of their hotel, it was arranged that this engine should be used for the purpose of driving the Gramme machines.

I pointed out at the outset to one of the directors of the railway company that the engine was not only sufficiently powerful to drive the machines, or even double the number, but that I feared that the engine main-driving belt would slip upon its countershaft pulley, when I was met with the remark that the arrangement would be but a temporary one, and that if the lights gave a fair degree of satisfaction the company would erect a special engine.

At this time four A Gramme and four Serrin lamps were used, and were of course found to be insufficient for lighting a station 500 ft. long, 205 ft. wide, and about 90 ft. high, so it was afterwards arranged to increase the number of lights to six, and instead of using the Serrin lamps I set up six of Crompton's lamps, and after running them for one year they were thrown out for reasons which I need not here explain. Brockie's lamps were then introduced, with occasionally very marked improved results, but these results have been as variable as the weather, the cause for which I shall have no difficulty in making perfectly plain to any ordinary mind.

During the daytime the engine is used for laundry purposes alone, and is driven to 78 revolutions per minute, the countershaft making 104 revolutions. At night when the Grammes—as well as laundry—are in use, the engine speed is raised to 88 revolutions, and of course the countershaft speed should increase in proportion, whereas it is a fact that it has been making but 104 to 105 revolutions, the slip of belt giving a decreased speed to the Grammes of about 140 revolutions per minute.

It is also a fact that when the engine has been driven to 95 revolutions, the countershaft makes only 105, and of this I have from time to time complained to the railway company, but their engineer would never admit it, nor would he tighten his belt until within the last three weeks, since which the lights have been giving the greatest satisfaction; but whilst this mere temporary arrangement has given the requisite speed for the Grammes, it cannot be relied on.

I need not explain to you what shortness of current means in the working of an electric plant, and as the railway company will not see the necessity of providing proper driving arrangements, after their repeated promises, the British Electric Light Company have determined to withdraw their plant, and on Tuesday night, the 31st instant, the electric lighting of the station by this system will cease.

I am, Sirs,

Yours obediently,

JOSHUA HORTON.

134, St. Vincent Street,

Glasgow, *October 28th*, 1882.

ELECTRICAL TRICYCLE.

To the Editors of THE ELECTRICAL REVIEW.

SIRS,—In your last number you favoured your readers with the news of an experiment made with Messrs. Ayrton and Perry's tricycle. The subject of road locomotion by electric energy is of immense interest to all classes. I venture, therefore, through your columns to ask Prof. Ayrton to enlighten the public with fuller particulars concerning this "invention." How many cells do they use to drive their motor, what current and electromotive force, how many hours will the vehicle run on a level road—at what speed, when once charged? What may be the weight and actual power of their motor, what kind of gearing is used to run at any reduced speeds?

A sketch in your valuable paper would prove most instructive. Since the machine has already been exhibited in the streets, there cannot be any further secret about these details. Yours obediently,

A. RECKENZAUN, C.E.

October 30th, 1882.

ELECTRICAL TRICYCLES.

To the Editors of THE ELECTRICAL REVIEW.

SIRS,—What is the use of an electric tricycle? The Locomotives (Roads) Act, Section 3, enacts that "every locomotive propelled by steam, *or any other than animal power*, on any turnpike road or public highway, shall be worked according to the following rules and regulations amongst others, namely: Firstly, at least three persons shall be employed to drive or conduct such locomotive; secondly, one of such persons while any locomotive is in motion shall precede such locomotive on foot by not less than 60 yards, and shall carry a red flag constantly displayed, and shall warn the riders and drivers of horses of the approach of such locomotive, and shall signal the driver thereof when it shall be necessary to stop, and shall assist horses, and carriages drawn by horses, passing the same." And by Section 4, the speed at which such locomotives shall be driven along a highway is limited to four miles per hour, and through a city, town, or village to two miles per hour. Is this how electric tricycles are proposed to be driven? That a tricycle *is* a locomotive within the meaning of the Act of Parliament if driven by other than animal power has been recently decided by the Queen's Bench in the case of Parkyns *v.* Priest, 7 Q.B.D., 313.

Yours, &c.,
CHANCERY LANE.

October 31*st*, 1882.

SECONDARY BATTERIES AS CURRENT REGULATORS.

To the Editors of THE ELECTRICAL REVIEW.

SIRS,—The interesting letter given in your last week's paper from Mr. C. H. Farquhar shows with what safety and regularity electric supply can be effected by the assistance of storage batteries, and undoubtedly a distribution of electrical energy without accumulators will soon become obsolete.

Your correspondent is perfectly right in attributing no novelty to his experiment, the introduction of secondary batteries in a system of supply having been patented by Mr. Lane-Fox as far back as 1878, in the specification of which patent the power of these to regulate the supply is specially referred to, in addition to their function as reservoirs.

Your obedient servant,
W. H. C.

27, Norfolk Road, Regent's Park,
October 30*th*, 1882.

SECONDARY BATTERIES.

To the Editors of THE ELECTRICAL REVIEW.

SIRS,—As much has been said in your valuable journal from time to time regarding secondary batteries, a few remarks from me may be interesting, if not instructive, to some of your readers.

In the early days of the Faure accumulator I was led, as were many others, to try some experiments in this direction, but soon found that there were many difficulties to contend against, the chief of which seemed the formation of the insoluble and badly conducting sulphate of lead on the plates, and in trying to eliminate this evil it occurred to me that if a more oxidisable metal were substituted for the spongy lead as a positive or generating plate that the electromotive force would be considerably augmented, and at the same time the formation of $PbSO_4$ be prevented. I accordingly tried an amalgamated zinc plate and a strong solution of sulphuric acid, and short-circuited the cell for a few days, the result being, as might have been expected, the formation of $ZnSO_4$ in solution and complete reduction of all lead oxide and sulphate to the spongy metallic state. The cell was now slowly charged with a current only just sufficient for the purpose, zinc being redeposited on the zinc plate, and a thick coating of pure peroxide formed on the lead.

On being tested the electromotive force was found to be considerably greater and the current more constant than with two lead plates, and when at rest no plumbic sulphate was formed.

Yours faithfully,
F. W. COOKE, A.S.T.E. and E.

Telegraph Department, G.N.R.,
Retford, *October* 31*st*, 1882.

NOTES.

NOTICE TO READERS.—Subscribers are hereby notified that in future the supply of back numbers of the ELECTRICAL REVIEW cannot be guaranteed by the publisher; it is therefore expedient that those who desire to complete their sets should do so at the first convenient opportunity. The publisher also desires to give notice that after December next all copies dated six or more months previously will be supplied only at enhanced prices, that is to say, 4d. numbers will be charged 6d., and others at similarly advanced rates.

ELECTRO-MOTORS.—We are informed by our Paris correspondent that in our description of the Jablochkoff motor an omission occurs. In reality, there exist two forms of the Jablochkoff motor. The first, that which we described last week, and which the illustration represented, is composed of a revolving bobbin with a core of iron in which the current is reversed, and of a fixed coil without iron, which the current always traverses in the same direction. It only bears two brushes. The second form, the most recent, has four brushes; the current traverses the revolving bobbin always in the same direction, and is reversed at each half-revolution in the fixed helix. It is in this last form that are found the advantages of the suppression of the magnetic masses in the parts which alter with the direction of the current in consequence of the complete suppression of the detrimental effects due to the magnetic inertia: the principle of its action is thus identical with that of the Bürgin motor. The motor, however, which is now in London is of the form we have already described. It may be interesting to compare an invention of M. Rapieff, which was patented in 1879, with that of M. Bürgin. We described in our issue of May 1st, 1880, one of the numerous dynamo-electric machines devised by M. Rapieff, and which he states in his patent may be also used as an electro-motor. The two are practically identical.

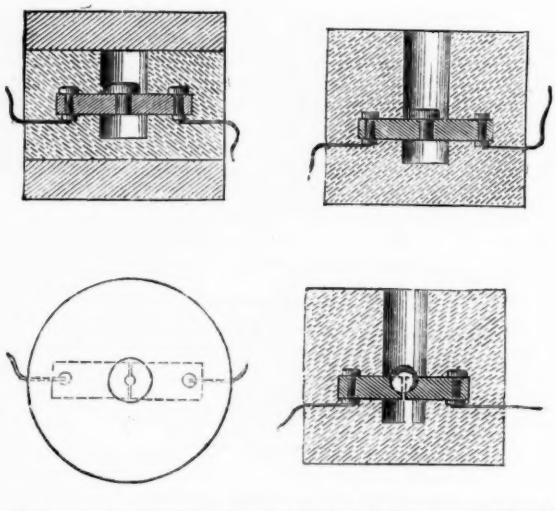
PARTNERSHIP NOTICE.—Mr. E. J. Paterson, the well-known electrical apparatus manufacturer, informs us that he has taken into partnership Mr. Charles F. Cooper, who for many years was connected with the celebrated engineers, Messrs. J. & H. Gwynne, of Hammersmith.

THE TELEPHONE IN THE FIRE-ALARM SERVICE.—The municipal authorities of Darmstadt, after a prolonged examination of the various apparatus for signalling the outbreak of fire, have decided upon the exclusive use of the telephone for this purpose. The Bell-Blake system has been selected as the most suitable for this purpose. A set of telegraph wires, including the whole town, is to be constructed and so arranged that the central office can communicate with every station singly, or with all at once. The apparatus will be supplied and erected by the Berlin firm, Armin Tenner.—*Electrotechnische Zeitschrift.*

EXPERIMENTS IN TELEPHONY.—The following tests of the Lockwood and Bartlett Telephones have recently been made by Mr. Waterbury, in America, and were designed to ascertain the limit at which good commercial talk could be assured with the ordinary style of instrument. He obtained from a telegraph company permission to use two of the thirty line wires which leave their office at the place where the tests were made, between the hours of two and four p.m., a very busy part of the day. The first trial was to a town, distant by wire ninety-six miles from the main office, where he and Mr. Bartlett were stationed. The experiment was begun by using a "ground circuit." Conversation was easily carried on with others at the other end of the line, the words being conveyed clearly and distinctly; the induction was hardly perceptible. A "metallic circuit" was then used, and it gave excellent results. The test was continued for about an hour, and during the time a severe thunder storm prevailed all along the line. By directions which were communicated to Dr. Waite (who was assisting) through the telephone, he went forward to a town one hundred miles beyond that in which he was first stationed. At two o'clock on the following day the tests were resumed; this time the stations were one hundred and ninety-six miles apart. Conversation was

carried on as before, and good commercial talk was had both with "ground" and "metallic circuits." Scarcely any induction noticeable. The severity of these tests will be apparent when it is considered that the wires used ran on the same poles with from fifteen to thirty others. Ordinary telegraph wires were used, which neither in construction or connection had been intended for telephone service. A trial was then made over three hundred miles of wire, under like conditions and with the same instruments, at which words and parts of sentences were sent and heard and understood. As a result, Messrs. Waite and Bartlett are now in possession of data which will enable them to construct a form of telephone especially for long distance service, or for over two hundred miles. Speech was transmitted at these tests, under the difficulties which have been enumerated, as clearly and distinctly as by the Bell telephone for short distances and on lines constructed especially for telephone service.

TRANSMITTER FOR TELEPHONE.—Reissue. Patent No. 10,183. Filed in the United States of America Patent Office, April 8th, 1882, by Robert M. Lockwood and Samuel H. Bartlett. Original No. 228,826, dated June 15th, 1880.



Claim.—1. A microphone transmitter for telephones, consisting of electrodes combined with a block or support of cork or equivalent non-resonant material, substantially as described, whereby said electrodes are covered or protected from the direct action of atmospheric sound-waves, said waves impinging upon the surface of and being transmitted through said non-resonant material to the electrodes, substantially as specified.

2. Plates or bars of carbon or other conducting material arranged with their adjacent sides or ends out of contact, and having their opposite ends firmly supported in a non-resonant material, in combination with the interposed button, arranged and operating substantially as described.

THE TELEPHONE AND FIRE ALARMS.—About a fortnight since, fire was discovered to have broken out in a wooden erection within the fish-curing yard at Point Law, Aberdeen, leased to Mr. T. Ross, fish-curer, Lossiemouth. Immediately on the discovery of the fire, information of the occurrence was communicated to the City Police Office from the dock gates by means of the telephone, which was introduced into the latter place some time ago. On the receipt of the intelligence at the Police Office, the telephone there, which is also connected with the houses of the inspector and the captains of the brigade, was put in operation in summoning them. The call was most effectual, for in less than five minutes the whole of the captains, five in number, were at the Central Station. It should be added that this is the first time that the telephone has been used since its introduction into the police offices for the purpose of summoning the Fire Brigade.

GAS *v.* ELECTRICITY.—The explosion of gas which occurred at a recent committee meeting of the Mile-End Vestry, just as the question of lighting the main road and other portions of the district by means of electricity was being discussed, does not require much comment. It is, however, highly probable that the vestrymen to the number of nearly a dozen who suddenly found themselves under the table, will vote in favour of the electric light.

ELECTRIC LIGHT FOR HELL GATE.—At a regular meeting of the Lighthouse Board of Washington, U.S.A., on the 13th ult., a report was received from the special committee on the lighting of Hell Gate by electricity, recommending Hallett's Point as the best available site for the electric light tower; also suggesting that the tower be constructed of iron, with a height of 250 feet, and to contain lights of 20,000 candle-power, which are to be displayed from sundown to sunrise. The report was adopted, and it was ordered that the necessary plans and specifications for the tower and machinery be prepared at once at the office in this city. It was also decided that all the machinery to be employed in this tower be duplicated, so that in case of accidents to any part of the machinery it can be replaced.

THE DANGERS OF ELECTRIC LIGHTING.—A prominent American electrician has recently given a New York *Herald* representative the following account of the fearful havoc which a "Brush" dynamo-electric machine is capable of producing. "Electricity," says the prominent electrician, "as generated in this system might be used with frightful effect as a defensive measure in time of war. Suppose I had in a fort a steam fire engine, with a hose that would throw a stream of water, a quarter of an inch in diameter, 300 feet. Now, if I had one end of a Brush machine grounded and the other end connected with the water passing through the hose, the very instant the stream of water struck a line of troops that were advancing to attack the fort it would kill them. The stream would then be really a flexible electric wire, and as it swept along the line of men it would mow them down like grass. If a thousand men were to march up in a solid body they could all be killed in ten seconds. It would be absolutely impossible to take the fort. It could be used with equally terrible effect in naval warfare. As soon as you make war so destructive as that, however, civilisation will do away with it."

We have oftentimes alluded to the danger to human life involved in the use of high tension currents, but we had never dreamed of the extent to which this mischief might be carried by ingenious Americans. We should be inclined to think there might be something in this novel application of electricity, did we not know that a column of water 300 feet long and only a quarter of an inch in diameter, has a property called resistance. Still the addition of a little sulphuric acid would improve its conductivity, and it might be well to insulate the engine to prevent the current passing down the water column inside the hose instead of flowing externally, and—what if soldiers wore rubber shoes? But it is not for us to suggest improvements, the whole idea is quite too original.

ELECTRIC LIGHTING.—Several additional lamps have been added to the galleries and corridors of the Dundee Fine Art Exhibition.

THE Northern Electric Light, Power and Appliances Company, Dundee, have just concluded a contract with Messrs. P. & D. Campbell, dyers, Perth, to light a portion of their dye works with a combination of arc and incandescent lamps.

THE Leith Town Council have received a number of notifications from electric lighting companies of their intentions to make application for the necessary Provisional Order. They have been reserved for consideration.

AT a special meeting on Monday the Town Council of Paisley unanimously resolved to apply to the Board of Trade for a Provisional Order to supply electricity for the public and private lighting of the town, in terms of the Electric Lighting Act, 1882. It was explained that this step was for the purpose of keeping private companies out of the burgh.

IN their report to June last, the directors of the Eastern Electric Light and Power Company (Limited) refer to the prohibition of illumination by means of overhead conductors as preventing the acceptance by the company of contracts, but adding that the Government have intimated that they will be prepared to adopt for India similar provisions to

those contained in the Electric Lighting Act of 1882, and to give similar facilities.

On Tuesday two deputations—one from Birmingham and the other from Sheffield—waited upon the President of the Board of Trade with reference to the subject of electric lighting. The object of the deputations was to point out the difficulty in which they, as undertakers, were placed while desirous to prevent any company or person obtaining a monopoly by holding a Provisional Order of the Board of Trade. Mr. Chamberlain, in replying, said that if the local authorities could not undertake the work themselves they must, in their own interests, endeavour to make some arrangement with an electric lighting company. It was impossible for the Board of Trade to postpone the issue of Provisional Orders. The Electric Lighting Act did not contemplate monopoly on the part of any one, and in the event of a public company obtaining a Provisional Order, and not satisfactorily carrying out the lighting arrangements of a locality, the Board of Trade would be prepared to consider any application from the local authority, or other body, for a second Provisional Order.

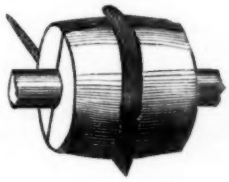
The 21st of December has been appointed by the Board of Trade for applications to be made for Provisional Orders under the Electric Lighting Act, but licences may be applied for and granted after that date.

Central Lighting Station at Middlesbrough.—The Yorkshire Brush Electric Light and Power Company, Limited, have just opened a central lighting station on the West Marshes, Middlesbrough. This station is for the purpose of supplying the electric light, both arc and incandescent, to the various ironworks, which form the staple industry of the district, and which are here grouped together in a comparatively small area. A substantial brick and iron building has been erected, and accommodation provided for an almost unlimited number of lights. The present plant consists of a twenty horse-power, semi-portable, compound engine, by John Fowler & Co., Leeds, driving a No. 8 Brush machine, or what is commonly known as a forty lighter. This plant, however, is only for temporary purposes, and it is intended to put down fixed engines of the most approved type whereby there may be a constant supply of electricity for several hundred lamps. The area it is proposed to light comprises about three square miles. A very successful start was made on the 22nd inst., when the lighting was commenced at the North Eastern Steel Works.

Mr. J. Banting Rogers on the Electric Light.—Mr. J. B. Rogers, of the J. B. Rogers' Electric Light and Power Company (Limited), 47, Holborn Viaduct, has written a pamphlet on "The Commercial Prospects of Electric Lighting in Combination with Gas Companies." The highest praise which we can bestow upon this badly-worded pamphlet of 15 pages is that it is worthy of the inventor of the system of *division* and *sub-division* of that "wondrous subtlety Electricity," which we had fondly hoped the world had heard the last of. Mr. Rogers deems it necessary to show himself now in his true colours, and as we believe the pamphlet will be forwarded on application, its readers can study Mr. Rogers as painted by himself. His speech at the meeting of the J. B. Rogers' Company, which can be seen in the pages of the Electrical Review this week, may be taken as fairly indicative of this literary effusion.

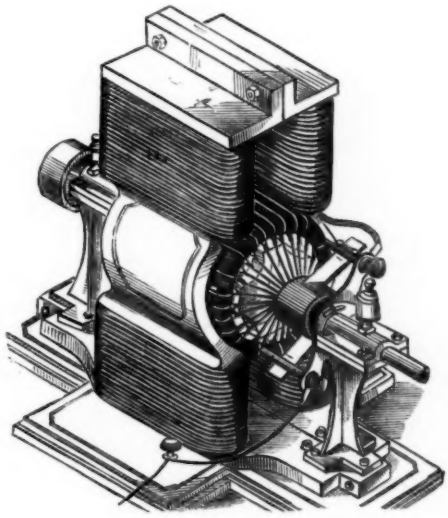
The "Pilsen" Arc Lamp.—The fancy fair at Belfast was lighted last week by four "Pilsen" lamps. We understand this to be the first introduction of the system into Ireland, and the steadiness of light compared with other lamps caused much comment. Messrs. Woodhouse & Rawson were the contractors.

Insulators and Supports for Electric Light Wires.—The sketch above illustrates a neat and simple form of earthenware insulator for holding fast electric light wires in factories, tunnels, or along walls generally. It is manufactured in such a way that by the insertion of a knife-blade into a crevice, which is left all round it, the insulator divides into halves. The wire can then be laid in one half, and the other closed over it, and all may be made firm and securely attached to any supporting body by driving in a



gas-hook, as shown. The patentees are Messrs. Woodhouse & Rawson, and doubtless their cheap and simple device will prove of service in electric light installations.

Dynamo-Electric Machine.—Patent No. 262,544, filed in the United States of America Patent Office, by James A. Jenney, April 15, 1882.



Claim.—1. The combination, in a dynamo-electric machine, of four electro field-magnets, which, with their connecting-plates and field-segments, are made in two solid continuous masses of iron, so formed and joined in a plane passing either vertically or horizontally through the centre of the armature-axis that the field-magnets in such casting shall be in line with each other and in the two castings parallel with each other, and which are wound with their field-coils in such directions that the two magnets in each casting shall have their similar poles joined in the field-segment connecting them, and that the two field-segments shall be of opposite magnetic polarity with respect to each other, said two castings to constitute, when joined and bolted together, the entire iron framework of the machine, exclusive of the armature and its mounting, with a cylindrical soft-iron armature, smooth and uniform in thickness in surface, mounted and revolving between the field-segments aforesaid, upon an open skeleton or framework of wood and brass or other non-magnetic material, adjustable in all directions from its central axis, the whole constructed, combined, and operating substantially as described and set forth.

2. In a dynamo-electric machine, a skeleton or framework for the mounting and carrying of a cylindrical iron armature, consisting of two hubs, made of brass or other non-magnetic material, with radiating arms of like material, adjustable in length by being set as screws into their hubs, and supporting at their extremities wooden bars pressing against the inner surface of the armature, substantially as described and set forth.

The International Electrical Conference.—We read that the International Conference for determining Electrical Units, which has been sitting in Paris for the last fortnight, has, after passing several resolutions, adjourned to the first Monday of October, 1883. In closing the conference, M. Cochéry, the Postal Minister, assured the members that the French Government would endeavour to give effect to their resolutions by representations to the various Governments concerned. It is hoped that the twelve months for which the Conference is adjourned will be sufficient for the searches in the various departments in question to be completed.

THE FRENCH CABLE COMPANY.—The special committee of the Board of Trade and Transportation of New York, to which was referred the question of ocean cable rates and of the disregard by the French Cable Company of its stipulations entered into with the Government of the United States, presented the following report, through Mr. F. B. Thurber, one of its members :—

On the 16th of July the House of Representatives, at the instance of Mr. Cox, of New York, passed a resolution calling upon the President for any information in possession of the Department of State relating to any change or modification in the stipulations which the French Cable Company made with our Government on the 19th of February, 1880. The State Department was very dilatory in furnishing the information, and it only came on the eve of the adjournment of Congress, and no action could be secured at that session. The answer of the State Department was to the effect that they were not aware of any modification of these stipulations; and there is little doubt that this company has wilfully disregarded the spirit, if not the letter, of its obligation to our Government—"not to combine with any other company for the purpose of regulating rates." Your committee recommend that the subject be pressed upon the attention of the next Congress, and that an effort be made to compel this company to comply in good faith with its stipulations, which would doubtless result in a return to the former rate of twenty-five cents per word, which rate was in force previous to the combination which took place on the 22nd of May last.

The report was accepted, and the following resolution was adopted on the motion of Mr. Thurber :—

Resolved, That the thanks of this board be and are hereby tendered to the Hon. S. S. Cox, member of Congress from this city, for his efficient aid in the matter of the French cable rates and also in securing safeguards for the public interest in the charters of two new ocean cable companies which were granted during the closing hours of the last Congress. In both of these, owing to Mr. Cox's exertions, provisions were inserted against pooling or combination, and in one of them a maximum rate of twenty cents per word was fixed on.

The companies referred to were formed by Philadelphia and Baltimore capitalists.—New York *Herald*, October 12th, 1882.

TRANSMISSION OF WORK TO A GREAT DISTANCE ON AN ORDINARY TELEGRAPH WIRE.—By M. M. Deprez.—The Electrotechnical Committee of the Exhibition of Electricity at Munich having requested me to repeat upon a telegraph line the experiments on the transmission of power which I had previously made over great resistances, I forwarded to Munich and Miesbach the fine wire machines which I had made use of in my laboratory experiments.

The telegraph line placed at my disposal by the administration of the German telegraphic system had a length of 57 kilometres. It is of galvanised wire 4·5 millimetres in diameter, and since, as a matter of precaution, I did not think fit to make use of the earth, I requested permission to employ a return-wire identical with the former. The total length of the line traversed by the contact is, therefore, 114 kilometres, and its resistance, on measurement, = 950 ohms. The insulation is good, but differs in nothing from that universally employed on all telegraph lines. The two machines, situate the one at Miesbach and the other at Munich, are absolutely identical, and have each a resistance of 470 ohms.

The total resistance of the circuit is, therefore, close upon 1,900 ohms. In the first experiment which was made there was immediately obtained at Munich a work of 38 kilogrammetres per second (or about $\frac{1}{2}$ horse-power), at a speed of 1,500 revolutions per minute.

The generating machine, situate at Miesbach, turned at the rate of 2,200. The two machines being identical, the proportion of the work recovered at Munich to the work expended at Miesbach was, setting aside passive resistance of every kind, $= \frac{1500}{2200}$, or more than 60 per cent. The machines employed are of Gramme's "atelier" type, modified according to my calculations.

A heavy rain fell during almost the whole duration of the experiments.

The receiving-machine serves at present to feed a waterfall of one metre in width and three in height, by means of a centrifugal pump.

Sparks are scarcely visible on the collectors of the two machines. The heating of the machines is scarcely appreciable after two hours' work.—*Comptes Rendus.*

EARTHQUAKES IN PERU.—The Panama *Star and Herald* of the 28th September says :—Latest news from Lima reaches to the 17th. It was transmitted by cable to Payta, thence by steamer to Equador, whence it came on by cable. On Thursday, the 14th inst., a severe earthquake was experienced in Lima, which was followed by a lighter one on Friday, the 15th inst. So far no damage is reported. It now appears the Payta cable was broken by this shock. Under date of the 5th October, the same paper says :—The *Retriever* has succeeded in picking up and repairing the Payta-Santa Elena cable, so that electrical communication is now complete between all the stations of the Central and South American Cable Company. Mr. E. W. Parsoné was in charge of the work. The break, as suspected, had been caused by the earthquake felt in Peru on September 14th.

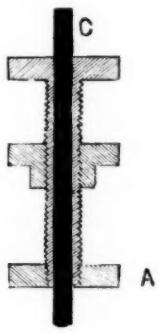
NEW LAND-LINE.—We are informed that the Panama Railway Company has constructed a new land-line across the Isthmus, as the telegraphic communication has been frequently interrupted from various causes. Iron posts have been used for this purpose.

THE KERITE ANTI-INDUCTION TELEPHONE CABLE.—We have received from Mr. A. G. Day, says the *Operator*, a sample of his latest form of aerial telephone cable. This new cable is designed to overcome certain objections pertaining hitherto to aerial cables of more than one conductor. It has been customary, in the construction of such cables, to cover each separate insulated conductor with tin-foil for the purpose of diminishing the interference caused by the induction of one current upon another. This has had the effect, however, of greatly increasing the static induction in each conductor, so that, on account of the retardation of the current, it has not been found practicable to use such cables for a greater distance than three or four miles. In the kerite cable each conductor has a covering of kerite, and outside of this a thin coating or wash of plumbago. The sample of the cable which we have contains 36 conductors. The central core consists of seven fine wires twisted together, insulated with kerite and covered with tin-foil. The remaining 35 conductors are placed in three layers of 6, 11, and 18 wires respectively, each wire being covered with kerite and washed with plumbago, as described. The layers are disposed helically, alternately to the right and the left. The entire cable is sheathed with tin-foil and enclosed in a strong fabric impervious to the weather. Mr. Day, the manufacturer, says these cables can be worked for a distance of ten miles either above or beneath the ground. The Metropolitan Telephone and Telegraph Company of this city has 12 miles of the kerite cables in use. They are also employed in Cincinnati, Chicago, St. Louis, Baltimore, Brooklyn, Detroit, Boston, and other cities. The Baltimore and Ohio Telegraph Company has kerite cables in use for telegraphic purposes between this city and Fourth Avenue and Flatbush Avenue, Brooklyn, a distance of about four miles.

THE SOCIETY OF TELEGRAPH ENGINEERS AND OF ELECTRICIANS.—The first meeting of the autumn session of this society will take place on Thursday, November 9th, at 8 p.m., when a paper will be read on the Munich Electrical Exhibition, 1882, by W. H. Preece, F.R.S., past president.

ROGERS' IMPROVED RELAY CONTACTS.—The oxidising and fusing of relay contacts is a constant source of trouble in some instruments. This, to a very great extent, arises from the contacts being made of an incorrect shape. The usual plan of having a small flat platinum plate soldered to the relay tongue, and a flattened point to the contact screw, although very generally adopted, is in reality a most defective arrangement, and it is the chief cause of sticking. The proper arrangement is to have the two surfaces in contact of

exactly the same diameter. In the Postal Telegraph Department the whole of the relay contacts are formed of platinum wire, about 1-16th of on inch in diameter, this wire being used both for the relay tongue and the contact screw; care is taken that the contacts are as nearly opposite one another as possible, so that no overlapping occurs. In cases where this form of contact has been substituted for the old point and plate, a marked improvement has been effected in the working of the instruments. Mr. F. M. Rogers proposes to get rid of the sticking by employing a carbon contact on the contact screw; as carbon cannot be melted, it is evident that the fusing of the two surfaces cannot take place. A point which deserves mention with reference to Mr. Rogers' invention (which is patented), is the fact that relays so fitted,



will work with the contacts screwed very close together, they will work in fact when the two actually touch; this is due, of course, to the microphonic action which takes place. For fixing the carbon in the contact screw, Mr. Rogers adopts the arrangement shown by the figure; a length of the carbon, c, about 1-16th of an inch in diameter passes through a tube tapped on the outside along its length. At the end where the contact emerges the tube is turned slightly conical, the screw thread being tapped on the cone; this end of the tube is slit down for a short distance by two slits at right angles to each other; by screwing the nut, A, along the conical end of the tube, the carbon wire becomes firmly gripped. This device enables the contact to be made good, if by any chance it should become broken.

An Experiment with the Electric Light.—By Lud. Pilleux.—Every one knows the action of continuous currents and the similar action of permanent magnets upon an electric arc produced by continuous currents. We know also, especially since the experiments of M. Jamin on the electric light, the action of alternately reversed currents upon an arc produced by alternately reversed currents, an action similar to the former. But the case is different with the action of continuous currents and permanent magnets upon a galvanic arc produced by currents alternately reversed.

The author then describes an experiment in which he studied this action under favourable conditions as follows:—

"Having at my disposal a powerful vertical voltaic arc of 12 millimetres in length, maintained by an alternately reversed current, and one of the most powerful magnets which M. Méritens makes use of for the construction of his electro-magnetic machines, I slowly approached one of the poles of my magnet to the galvanic arc. As soon as I had got to the distance of about 10 centimetres, I saw the arc flatten itself out so as to take almost the appearance of bat's-wing gas-burners, the plane of the bat's wing being parallel to the pole of the magnet.

"At the same time the arc began to give out a loud noise, like that of hail when it falls upon window-panes.

"As I approached the arc grew narrower and the noise increased so as to be deafening. When the magnet was not more than a few millimetres distant from the arc the latter, which had become thinner than a leaf of paper, burst asunder with a crash, scattering fragments of glowing carbon.

"The magnet which I used being a horse-shoe, it was easy to change the pole presented to the arc by a small sidewards movement. The arc then executed a most singular pirouette, revolving on itself, so as to present to one pole a different surface from what it had presented to the other."—*L'Italienne.*

NEW COMPANY REGISTERED.

Scottish Gülcher Electric Light and Power Company (Limited).—Capital £150,000, in £5 shares. Objects: To purchase the exclusive licence for the use of the Gülcher System of Electric Lighting in Scotland, for £25,000 in cash, and £25,000 in fully paid shares. Signatories (with one share each): F. Grant, 93, Leconfield Road, Highbury New Park, N.; C. R. A. Darby, 418, Commercial Road; A. W. Barneveld, 87, Sharedeloes Road, S.E.; J. H. Slater, 58, Haverstock Hill; W. C. Cross, 4, Mona Road, Peckham; W. J. Vokes, 360, Kennington Road; J. Arnold, 15, St. Andrew Street, Wandsworth Road. The signatories are to appoint the first directors; remuneration £500 per annum. Registered 27th ult., by Quick and Bidder, 13, George Street, Mansion House.

OFFICIAL RETURNS OF ELECTRIC COMPANIES.

The following returns have been recently filed:—

Anglo-American Telegraph Company (Limited).—The annual return of this company, made up to 24th of February, was filed on 14th of March, and states the nominal capital of the company to be £7,000,000 stock, fully paid up.

British Electric Light Company (Limited).—The annual return of this company was made up and filed on 27th July. The nominal capital is £100,000, in £10 shares; 7,221 shares are taken up and the full amount has been called upon the same. The calls paid amount to £71,600 and unpaid to £310.

Direct Spanish Telegraph Company (Limited).—The return of this company, made up to the 14th of April, was filed on 30th April. The nominal capital is £130,000, in 13,000 ordinary shares of £10 each; and £60,000 in 6,000 10 per cent. preference shares of £10 each. 12,931 ordinary, and 5,843 preference have been allotted. Upon the former £9 has been called up, and the full amount upon the latter. The calls paid upon the ordinary shares amount to £116,379, and upon the preference to £58,430.

Single Wire Multiple Telephone Signal Company (Limited).—The return of this company, made up to July 6th, was filed on July 21st. The nominal capital is £5,000, in £10 shares. 102 shares have been taken up and are fully paid.

Manchester and District Edison Electric Light Company (Limited).—The return of this company, made up to the 6th ult., was filed on the 23rd ult. The nominal capital is £600,000, in £10 shares. 20,000 shares have been allotted, and £2 per share called up, the calls paid amounting to £20,000. (?)

Electric Light Syndicate (Limited).—The return of this company, made up to September 23rd, was filed on the 24th ult. The nominal capital is £3,000, in £50 shares. 51 shares have been allotted and the full amount called thereupon, the calls paid amounting to £2,500 and unpaid on forfeited share £50.

Albion Electric Lamp Company (Limited).—The return of this company, made up to September 28th, was filed on the 5th ult. The nominal capital is £10,000, in £10 shares. 886 shares have been taken up. The full amount has been called on each paid-up share and 2s. 6d. upon each share of the second issue. The total calls paid amount to £2,036. 7s. 6d.

Cuba Submarine Telegraph Company (Limited).—The return of this company was filed on February 8th. The nominal capital is £220,000, in 22,000 shares of £10, viz., 16,000 ordinary and 6,000 preference. The full amount has been called up, the calls paid amounting to £220,000.

Brazilian Submarine Telegraph Company (Limited).—The annual return of this company, made up to May 26th, was filed on June 5th. The nominal capital is £1,300,000, in £10 shares. The whole of the shares are taken up and fully paid.

NEW PATENTS—1882.

5097. "Secondary batteries." R. Hammond and L. Goldenberg. Dated October 26.

5098. "Electric lamps." A. Mackean. (Communicated by A. Kryszat.) Dated October 26.

5104. "Improved compounds or preparation of materials for use in place of leather, and for electrical insulation, enabling improvements in the manufacture of electric conductors." M. Bauer, L. Brouard and J. Ancel. Dated October 26.

5105. "Improvements in electric lighting, and in apparatus connected therewith, partly applicable to other purposes." P. Cardew. Dated October 26.

5108. "Galvanic batteries." P. R. de F. d'Humy. Dated October 27.

5122. "Electric current generators and motors." S. P. Thompson. Dated October 27.

5126. "Telephonic apparatus and electric call bells." H. G. Ellery and J. T. Gent. Dated October 27.

5129. "New or improved compositions for insulating conductors of electricity, and for other like purposes." E. W. Tobe. Dated October 27.

5142. "Electric lamps or lighting apparatus." W. R. Lake. (Communicated by B. Egger.) Dated October 28.

5148. "Improvements in the organs of dynamo, magneto, or electromotive machines, and in other electrical apparatus, in the construction of which iron, cast-iron, steel, and other metals are used." B. J. B. Mills. (Communicated by F. Chutaux.) Dated October 30.

5149. "A new or improved process for increasing the conductibility of, and for insulating round or flat cables or wires employed in the construction of magneto and dynamo machines, and other electrical apparatus." B. J. B. Mills. (Communicated by F. Chutaux.) Dated October 30.

5158. "Apparatus for producing and regulating electricity." J. D. F. Andrews. Dated October 30.

5164. "Telephonic apparatus." J. G. Lorrain. Dated October 30.

5166. "Circuits for telephonic communication." H. Alabaster and T. E. Gatehouse. Dated October 30.

5167. "Telephonic receiver." H. Alabaster and T. E. Gatehouse. Dated October 30.

5170. "Electric batteries." F. Wirth. (Communicated by G. Leuchs.) Dated October 30.

5174. "Arc electric lamps." F. S. Willard. Dated October 31.

5181. "Apparatus and appliances for accommodating electrical conductors in the streets of towns." H. F. Joel. Dated October 31.

5182. "Telegraph printing and time regulating apparatus." J. Imray. (Communicated by A. A. Knudson.) Dated October 31.

5183. "Improvements in secondary voltaic batteries, and in apparatus for regulating their charge and discharge." R. H. Woodley and H. F. Joel. Dated October 31.

5200. "An improved method of controlling valves or cocks by electricity or by heat, and in the means employed therefor." J. Formby. Dated October 31.

5205. The utilisation of various gums as substitutes for gutta-percha and india-rubber for insulating and other purposes." J. E. T. Woods. Dated November 1.

ABSTRACTS OF PUBLISHED SPECIFICATIONS.

1882.

1137. "Telegraphic apparatus, &c." W. H. Davies and F. H. W. Higgins. Dated March 8. 1s. Relates to apparatus similar to that described in the number of the Electrical Review for Sept. 15th, 1881.

1163. "Electric lighting apparatus." W. R. Lake. (A communication from abroad by E. Weston, of America.) Dated March 10. 6d. This invention relates to electric arc lamps in which are employed, in conjunction with a single set of feed regulating magnets, two sets or pairs of carbon pencils and independent feeding devices connected therewith, which devices, by the consumption of the carbons, are brought successfully under the controlling influence of the aforesaid magnets. In lamps constructed according to this invention the carbons or electrodes are fed and adjusted by means of clutch mechanism consisting essentially of a plate or bar connected at one end to a movable armature, or its equivalent, and resting at the other end upon a lamp-frame. The said plate or bar is perforated and surrounds the carbon-carrier. When the armature is raised and the plate connected therewith is tilted a short distance it grips the carrier so that the position of the latter depends upon the elevation of the armature.

1171. "Mechanism for regulating the burning of carbon or other electrodes in electric lighting apparatus." A. Graham. Dated March 10. 8d. Relates to mechanism to be applied to electric lamps or lighting apparatus for regulating the burning of the carbon or other electrodes thereof by currents generated in a dynamo-electric machine or in a battery.

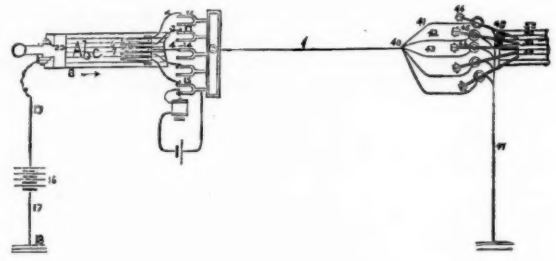
1173. "Electric accumulators." J. H. Johnson. (A communication from abroad by A. de Méritens, of Paris.) Dated March 10. 2d. Consists in certain improvements in the construction and arrangement of the secondary batteries or electrical accumulators, whereby they are rendered more durable and efficient. (*Provisional only.*)

1174. "Generation, distribution, storing, &c., of electricity, and apparatus therefor." J. S. Williams. Dated March 10. 1s. 8d. Relates to apparatus, methods and means for generating, distributing, storing, utilising, measuring, and regulating electricity, and consists partly in utilising the water reservoirs and the pipes or mains for conducting and supplying the water to cities, towns, and other places, for the purpose of driving water or turbine wheels with which are combined dynamo or magneto-electric generators for producing electric currents.

1191. "Regulating the generative capacity of dynamo or magneto-electric machines." T. J. Handford. (A communication from abroad by Thomas Alva Edison.) Dated March 11. 6d. Has for its object the provision of simple and efficient means and methods for automatically regulating the generative capacity of dynamo or magneto-electric machines, which means will act automatically upon the addition and removal of lamps or other translating devices to produce corresponding changes in the energy of the exciting or field of force magnet. According to one modification, the lamps or other translating devices are divided into groups, the lamps of each group being those that are in multiple arc or derived circuits from the same pair of conductors branching from the main conductors. There is provided in connection with each group means for regulating the current energising the field magnet of the machine operated by the current generated and acting automatically upon the addition or removal of translating devices in the group. This means may be an electro-magnet in one of the branch conductors having an armature lever retracted by a spring and making and breaking a circuit, which may be a shunt around a definite resistance in the field circuit or an additional field circuit, the result in either case being an increase in energy of the field magnet by the closure of the circuit controlled by each of these electro-magnets. Each of these magnets is so constructed and arranged with relation to its armature lever that it will not draw the lever to its front contact until a number of the lamps of the group have been turned on, so that the additional energy given to the field magnet by the operation of the devices connected with each group will be sufficient for the supply of all the lamps of the group.

1195. "Electric circuits, &c." W. P. Thompson. (A communication from abroad by H. Kerner, of New York, America.) Dated March 11. 6d. Relates to the burglar alarm apparatus described on page 311, in the number of the Journal for October 21st.

1222. "Transmitting and receiving telegraphic messages, &c." H. H. Lake. (A communication from abroad by A. L. Parcelle, of America.) Dated March 14. 8d. The first part of this invention relates to that class of automatic telegraphs known as "*fac-simile*," "autographic," and "pantographic," in which a practical *fac-simile* is produced at a receiving station of the line of a message written at the transmitting station. The part of the said invention has for its object to provide an improved apparatus of the class adapted to reproduce in *fac-simile* a message written on ordinary paper with a metallic ink, and to this end it consists in the employment at the transmitting station of a series of reeds, each tuned to vibrate at a different rate from the others; a corresponding series of reeds at the receiving station, each series having a corresponding series of electro-magnets, a metallic table connected with the receiving reeds in a local circuit,



and adapted to support a strip of chemical paper for the action of the receiving reeds, and means for closing a circuit through either of the transmitting reeds the line and the corresponding receiving reed by the action of lines or characters written in metallic ink on ordinary paper at the transmitting station, so as to reproduce in *fac-simile* upon the chemical paper at the receiving station, the characters written in metallic ink at the transmitting station. Referring to fig. 1, the main line is subdivided at the transmitting station, into a series of branches, 2, 3, 4, each of which branches includes in its circuit a pressure spring, 5, 6, 7. These springs press upon the surface of the transmitting sheet, 8, on which the message represented in the figure by letters A, *b*, *c*, has been previously written with conducting ink. The paper sheet, 8, is provided with parallel lines ruled with conducting ink in the direction of the motion of the sheet, as represented by the arrow. The springs press upon the intervening spaces between these ruled lines. Each branch, 2, 3, 4, also includes a rheotome, for rendering the current pulsatory. It is preferred to use for this purpose the tuning forks seen at 12, 13, 14, 15, which are kept in continuous vibration by the action of local batteries, of which an example is shown, together with a convenient system of cir-

cuit-wires as applied to the tuning fork, 15. One pole of the main battery, 16, is connected by means of the line, 17, with the earth at 18; the other pole is connected by means of the line, 19, pressure clip, 20 (which serves to secure the paper to its underlying holder), ruled lines, 9, 10, 11, to the characters written upon the transmitting sheet. It will, therefore, be understood that, whenever one of the springs, 5, 6, 7, comes in contact with any line of the written message, the battery, 16, will be put in connection with the main line, the current traversing the line, 19, pressure clip, 20, ruled lines, 9, 10, 11, the character to be transmitted the spring in contact therewith, the particular rheotome situated in the said branch circuit, and the main line. If simultaneously two or more of the branch circuits are thus closed, the resulting pulsations upon the main line will be made up of the contributory pulsations of the fractional currents. Further, it will be understood that the duration of the contact of the springs, 5, 6, 7, with the lines of conducting ink, will depend upon the longitudinal width of the said lines, while the instant of contact will depend upon their situation upon the transmitting sheet.

1225. "Apparatus for gauging carbon filaments, wire, &c." M. Evans. Dated March 14. 6d. In the manufacture of incandescent electric lamps it is important that the carbon filaments in all the lamps which are to be actuated by electricity from the same source of supply should be of one uniform thickness or gauge; the process of gauging or testing the thickness as hitherto followed is slow and tedious, and can only be efficiently performed by practised persons. The primary object of the invention is to construct an apparatus by which the gauging of the filaments can be rapidly performed by persons of little or no experience. The invention essentially consists in the employment of a movable jaw, between which and a fixed jaw or stop the filament to be gauged is held, the greater or less proximity of the movable jaw to the fixed jaw, as determined by the thickness of the filament, regulating the angle or position of a mirror which reflects a pencil or beam of light upon a screen marked off as a scale. The particular point of the screen to which the light is reflected indicates the gauge or thickness of the filament.

1254. "Telegraphic relay." J. Ebel. Dated March 15. 4d. Relates to an improved telegraph relay, and has for its object to so construct such a relay, that it will be very simple and extremely sensitive, and will cost but little to manufacture. In carrying the said invention into practice the inventor employs an electro-magnet, with one bobbin of insulated wire, within which is placed a compound soft iron core. The centre part of this soft iron core moves freely on pivots and is prolonged on both ends in the form of tongues or armatures. Adjacent to each of the said upper and lower armatures are arranged steel horse-shoe magnets, which are so placed with regard to the said armatures, that the same can move to and fro, or vibrate between their poles. It follows from the above described construction of the relay that if a weak or feeble current is produced in the wire bobbin, it will magnetise and induce magnetism in the iron centre core and armatures, and will, consequently, according to their polarity, be attracted or repulsed by the poles of the magnets.

1271. "Telephones." A. W. Rose. Dated March 16. 4d. Has for its object to so construct and combine the receiving, transmitting, and magnetic signalling parts of telephonic apparatus together, that the instrument so combined is more convenient in use than has hitherto been the case, and so also that the cost and inconvenience of combining these parts after the instruments are sent out of the factory are avoided.

1274. "Incandescent electric lamps." F. Wright and M. W. W. Mackie. Dated March 16. 2d. Relates to improvements in electric lamps operated by incandescence, and consists, firstly, in an improved form of vacuum bulb, with tubular stem for carrying the conducting wires and pump tube. Secondly, in the production of vegetable fibres free from mineral and inorganic matter as the bases of the filaments or bridges. (*Provisional only.*)

1288. "Incandescent lamps, &c." J. B. Rogers. Dated March 16. 6d. Relates to certain improvements in incandescent lamps, also in fittings and switch attachments for electric light apparatus. According to the first part of the invention, the inventor fits two terminal ends of platinum or other suitable metal within the globe or other glass; the ends have the filament attached by inside conical tubes of platinum or other metal into which the two ends fit and keep themselves in contact, and prevent any slip of the filament from the ends of the poles. By this means perfect contact is insured. The ends may be hard soldered if necessary. According to the second part of the invention, the inventor screw-threads the socket of an incandescent lamp and terminates the two wires or one wire only at the base. He also screw-threads the socket attachment and terminates the lead wire or wires just outside its end, so that when the two screw-threaded pieces are screwed into close contact the wires are put into electrical connection. On the socket being turned in the reverse direction the contact of the wires becomes broken.

1302. "Electrolier." The Honorable Reginald Brougham. Dated March 17. 6d. Has for its object an improved electrolier. This electrolier is intended for the exhibition of several electric lamps of the incandescent type. It consists of a tubular stem or upright descending from the ceiling of the room to be lighted, or fixed vertically in a suitable standard, or otherwise suitably supported. There is a collar upon the stem near its end, and beyond this again a flanged nut is screwed upon the stem. Between the collar and the nut two metal plates of ornamental form are clamped and held. These plates are kept apart by a thick disc of vulcanite (or other non-conductor) and thinner discs of like material serve to insulate the plates from the collar and the nut upon the stem. The parts of the plates overhanging the separating disc are formed with radial grooves on their inner surfaces. The neck of the lamp or glass bulb in which the carbon filament is enclosed is set into a socket of vulcanite or other material, and two brass springs or plates are fixed to the exterior of this socket diametrically opposite to each other; to these springs or plates the wires which enter the glass enclosure are attached. Each lamp when thus set into a socket is inserted between the two plates carried by the stem or upright of the electrolier, and the springs or plates entering the radial grooves serve to hold the lamps in place. The same springs provide the electrical connections for the filaments, the plates being in connection with the electric source. Conducting wires pass down the interior of the stem, and are brought out through a hole in the separating disc of vulcanite or other insulating material and connected to the plates.

1303. "Telegraphic and telephonic systems." P. M. Justice. (A communication from abroad by Fr. Van Rysselberghe, of Belgium.) Dated March 17. 6d. Where a network of wires exist which are employed for ordinary telegraphy, it has hitherto been extremely difficult to practically employ one or more wires for telephonic communication owing to the loss of current by induction, and also to the currents induced from other lines. The object of the present invention is to remedy this defect, and to enable one or more wires of a system to be employed for telegraphy or for telephonic communication. This result may be attained by modifying the present known systems and apparatus, and by applying known instruments which have not hitherto been employed to secure the object indicated. The modifications consist principally in using batteries of low resistance, microphones coupled up in quantity, induction coils of high resistance, and condensers.

1324. "Electric lamps." J. D. F. Andrews. Dated March 18. 6d. Relates to a clutch lamp and has for its object great delicacy and certainty of action. In the present invention the inventor effects the object by detaching the clutch from the armature that works it so that this armature is capable of giving a certain amount of regulation without working the clutch, and works it only when feed of the carbon is required.

1327. "Transmission of electric currents of high tension." L. J. Crossley, J. F. Harrison, and W. Emmott. Dated March 18. 6d. Relates to the arrangement of certain electric appliances by means of which telephone and other lines of suitable resistance may be used for the conveyance of powerful currents of electricity for electric lighting, electro-plating, the transmission of power and for other purposes where electricity of high tension is employed without danger to the usual telephonic, telegraphic and other instruments. In carrying out the invention in connection with the conveyance of high tension electricity over telephone lines the inventors place in the exchange a number of dynamo-electric machines or other suitable generators of electricity connected with a switching arrangement by means of which the currents generated may be distributed to the various subscribers. Connected with the switch is an annunciator adapted to suit high tension currents by means of which any accident to the line is immediately made known at the exchange, the said annunciator also allows the subscribers to call the attention of the operator in case they wish to speak during the time the high tension currents are passing over the line. Connected with each subscriber's instrument is a relay or other appliance constructed and arranged so that the high tension currents for electric lighting or other purposes shall not injuriously affect the said instruments; a secondary battery may be used in connection with the said instruments, by means of which a supply of electricity can be stored to allow the subscribers to use the telephone without interfering with the light or otherwise. Arrangements may be provided whereby the secondary batttery can be charged from the exchange without troubling the subscriber.

1356. "Telephonic receiving apparatus." R. Theiler and M. Theiler. Dated March 21. 2d. Relates to an improved and simplified construction of telephone receivers in which the tympanum or diaphragm, also the permanent magnet and the ear-piece or funnel common to other telephones, are entirely dispensed with. In the telephone receivers of Reis, Gray, Bell, and other inventors, the tympanum, diaphragm, or sounding board constituted a necessary part of the apparatus, because the electro-magnet and armature constituting the remaining parts of the apparatus were not constructed in such a manner that the vibrations of articulate speech could be heard without the aid of a tympanum or other resonant surface. The new telephone receiver consists only of an electro-magnet, to one pole of which is usually fixed a stem or knob which can be conveniently inserted in the ear of the listener. The vibrations of the electro-magnet produced by the vibratory current passing through the latter are thus directly communicated to the walls of the ear, and the effect of those vibrations upon the ear is not diminished by an intervening air space, as is unavoidably the case in telephones with tympanums or diaphragms. (*Provisional only.*)

CITY NOTES, REPORTS, MEETINGS, &c.

THE EASTERN EXTENSION, AUSTRALASIA AND CHINA TELEGRAPH COMPANY (LIMITED).

Under the presidency of Mr. John Pender, M.P., chairman of the company, the eighteenth ordinary general meeting of the shareholders of the above-named company was held at the City Terminus Hotel on Wednesday afternoon.

The secretary, Mr. F. E. Hesse, having read the notice convening the meeting,

The Chairman said: Gentlemen, you have had the report in your hands for some days. I presume you will take it as read (agreed). The revenue you will observe is as follows: gross receipts for the

half year ending June 30th amount to £207,119, against for the corresponding period of 1881 £191,580, showing an increase of £15,539. Of this £3,728 is due to profit on exchange and additional interest on loans during that half year, and the balance £11,811 represents growth of affairs. The expenses for the half year have been £50,355, against for the corresponding period of 1881 £54,098, a decrease of £3,743. This is caused by the expense of the repairing of ships being reduced in consequence of the chartering of the steamer *Agnes* by the New Zealand Government for the repairing of their Cook's Straits' cable. The net revenue has been £113,393, against, for the corresponding period of 1881, £94,755, showing an increase of £18,638. The dividend due on the half-year, together with the bonus of one shilling per share, making 3 per cent. for the half-year, has been distributed. The board has also charged £30,000 against the half-year's revenue in payment of the balance, leaving £23,468 to be carried forward. This cable has worked well since put down in November, 1881. It would be interesting to mention that the brass riband cable laid four years ago in the original Java-Darwin cable has so far successfully resisted the action of that troublesome insect, the teredo, which was found to be so destructive on the old Batavian section. The remaining sections have been interrupted but a few hours whilst repairing the numerous small faults which have developed from time to time. Having stated thus much concerning our figures, I will now give you some facts connected with the working of our system during this last half-year. And before I ask you to approve the report and accounts, I desire to make a few remarks. Generally speaking, our system has been working well during the last six months. You are all aware that a considerable interruption, extending over a long period, occurred from the state of affairs in Egypt. The Eastern Company's service was so far interrupted across the Isthmus of Suez. That is now restored in such a way as, I hope, will prevent in the future any recurrence of a similar interruption. But fortunately for this company, as well as for the Eastern Company, the arrangement we had made with the Indo-European cable enabled us to carry on our traffic if not as efficiently, yet without any loss to the Eastern Company; and consequently without any loss, as you may see from the accounts laid before you, to the Eastern Extension Company. We have given very special attention to making our system as efficient as it is possible to make telegraphic communication. We have battled with the difficulty of the little insect teredo, and we have become the master. I am glad to say that we have positive evidence that we have been able to make such a cable that protects us against the ravages of this insect. We have still 230 miles in our system which is not armour-plated against this insect. It is our intention to replace that cable by a cable which will be perfectly proof against it. We shall take up the old one, which will be utilised in an efficient manner, and shall at the same time put our system into an efficient state. With reference to the Singapore-Batavian cable, which I previously stated would cost £94,000, we have now wiped out that sum, having placed £30,000 to that account in the balance sheet, which was required for those alterations in our system; therefore our capital has not increased, but our system has been materially strengthened for dividend paying. We wish to be in such a position, having such a system of telegraphy that will be efficient, and not only be appreciated by our shareholders and by those who use it, but that its security will be so much greater in the future than in the past, which will enable us to have more confidence in our dividend than hitherto. I think we have also in mind some important additions which I do not desire should add to our capital, so as to secure an alternative line, and embrace parts of the world not hitherto within our scope. All that we have in the future, and I hope, looking at the satisfactory accounts before you to-day, and looking to the future, we do not intend to increase our capital, but to increase the system which is under our control. I now propose the adoption of the reports and accounts now presented.

Viscount Monck seconded the motion.

Mr. Newton remarked that their company held one of the strongest positions of any company in existence, and he was sorry they did not pay an equal dividend with other companies. He endorsed the policy of the board generally, except that with reference to the reserve fund. They would hardly know how their reserve money stood by the way it was expressed in the balance-sheet. He was of opinion that money should go to the capital account, and not so directly to the reserve fund. He thought the present generation of shareholders should have the benefit of their earnings now, and not so much money be reserved. As it required under £20,000 to give the shareholders another one per cent., he thought they should have it in so prosperous a company as that was. No other company in existence carried so large a sum to the reserve fund as they did, at least no company with duplicated cables such as they had, and the generations to come would get the benefits of dividends instead of the present one, if they continued to work as successfully in the future as in the past. The £30,000 which they had transferred to reserve should first have been put to capital account. He thought there should have been clear figures on that point in the balance-sheet. He thought then the first security holders would have then had the satisfaction of seeing what a valuable property they had. He did not know whether it was that the board did not wish to surpass the Eastern company by giving 7 per cent., whereas they would probably remain at 5 or 6 per cent.? He hoped the time was not far distant when they would see themselves ahead of Eastern, for it was not possible, he thought, for a cable to be laid in competition with their field of work. They had no prospect of competition, and he thought, therefore, they of the present generation who had such a property should certainly have a little more than 6 per cent., and go on for 7 or 8. He also thought they should be able to get their debentures at 4 or 4½ per cent.

Mr. Abbott could hardly approve of the idea of making one telegraph company pay a larger share of dividend than another. He thought the fact that their stock stood so well in the market demonstrates the prudence of the management of the board, which would, he thought, be endorsed by the shareholders. Addressing the chairman more personally, Mr. Abbott said that Mr. Pender, so the newspaper had said, had been, to use a sporting phrase, "got at" by the Americans. He should be very sorry if Mr. Pender had lent his name to such a combination as the Western Union Telegraph Company, and he thought he would then be taking the very worst course he could. He thought their chairman should be so kind as to state to the shareholders why he did not join the Western Union Telegraph Company by joining the board.

The chairman in reply to the questions asked, said he was not at all surprised at Mr. Newton's criticism. He was quite sure Mr. Newton would agree with him in this, because he touched a very important point in their policy, and that was to get the debentures out at four per cent. if they possibly could. Mr. Newton would agree with him that they must get such a reserve as would enable them to make those bonds beyond all question secure (hear, hear). Whilst he should be glad to hear from Mr. Newton similar criticisms, he should be prepared to give his reasons. The board were increasing the property of the shareholders very materially. He would say, "Do not attempt to eat your cake and have it." That increase would enable the board to carry out the policy of this in such a manner as would enable them to preserve a sound footing. If people saw the reserve fund decrease, they did not like it; and it was better to please the people and keep the money in it. It amounted to the same. It was only a question of accounting. It was put to the reserve without passing it through the capital. He could assure Mr. Abbott that the interests and honour of the gentlemen associated with him in submarine telegraphy were as dear to him as their own. (Hear, hear.) The course he should pursue would be for the benefit of their cables and those interested in them. He was not "got at" by Mr. Field, nor by any other gentleman in America. He received generous and munificent treatment in that country.

The motion was then put and carried.

Mr. Abbott proposed a vote of thanks to the chairman, which was seconded by Mr. Newton, and the proceedings terminated.

THE BRAZILIAN SUBMARINE TELEGRAPH COMPANY (LIMITED).

THE 18th ordinary general meeting of the shareholders of the above-named company was held at Cannon Street Hotel, on Friday, 27th ult., Lord Monck, Chairman of the Company, presiding.

Mr. Richard Collett, secretary, having read the notice convening the meeting,

The Chairman said: Gentlemen, I presume as usual you will take the report as read? Well, in moving its adoption, I have to make a few observations to you. The first in point of time and in point of importance is a consideration of what is the condition of your working plant. I am happy to tell you that it is in a perfectly sound condition; and within the last few hours we have received information, that the fault which you will perceive by the report existed in the Lisbon section has been removed, and the work of restoring communication by the cable has been practically accomplished. Gentlemen, I have a few words to say presently on that subject; I merely allude to it incidentally now in reference to your plant. I think if you will take the trouble of looking at the report sheets from the beginning of this company, you will find that there has been a steady, gradual, and progressive increase in receipts. I am happy to inform you that I can carry that information further than the tables published, which only go so far as June 30th last; and I can tell you that that increase of receipts has been going on since July in an accelerated rate. Well, gentlemen, the next subject which naturally suggests itself is the expense of working your plant, and of so obtaining these receipts. You have all, I presume, the report in your hands, and have had the opportunity of comparing it with other reports of previous years, and you find that the expenditure at the end of June last was £23,155, which, compared with the previous half-year, shows an increase of £10,686, which seems a large sum. You will find that £10,406 of that sum is due to the repairs of the Pernambuco shore end, which gave out last year; and we have effected its repair and renewal out of receipts, so that really the increase is only £282, which mainly consists of those items which naturally increase with the increasing traffic and increasing age of the company; I mean such items as salaries, which is responsible for £157 of the increase; rent, repairs, and so on, which, of course, increase as the number of *employés* increases, that number being necessary for the transaction of the larger business which you are doing. Well, gentlemen, so much for your expenditure and receipts. You are aware—happily and satisfactorily aware—that we have paid you within this year practically 7 per cent. on your capital, and we have done that now for the second year, having in the two preceding years paid you but 6 per cent. If this were an ordinary occasion, I should now sit down, having stated what I consider a flourishing condition of your affairs, and simply move the adoption of the resolution. But I think the fact that we have commenced duplicating the cable marks an epoch in the history of your enterprise, and justifies me in giving you a very brief review of what has been done from the beginning, and of calling your attention to the prospects of the company in the future. This company was started in 1873. You will remember that there was a delay in the completion of the Lisbon-Maderia section of the cable, which prevented the company commencing working before July, 1874. From the time that you commenced operations, I do not mean from the time that you commenced working, but commenced in the way of fitting yourselves for it, you have received 5 per cent. on your capital. You have received 7 per cent. for two years, and 6 per cent. for two years more. So that would give you 5 per cent. during the year its construction was taking place, and leave a little balance to your credit. I have often heard in this room, and at other meetings of this character, that 5 per cent. was not too large a dividend

on money sunk under the sea, and in such a risky condition as is capital invested in submarine cables is generally supposed to occupy. Well, gentlemen, I have never disputed that fact, but the policy of your board has been always so to manage your affairs as to get rid of the element of uncertainty, which is the element which renders 5 per cent. a bad return for money invested in this way. I have been told we were paying too small a dividend and putting aside too large a sum for renewals. We have rendered your investment secure, and so endeavoured to make it apparent that 5 per cent. is not a bad dividend on money invested in submarine cables. I have previously alluded to that line of policy on the part of the board, and we are now reaping the benefit of that policy, because we have now renewed the cable between Lisbon and Maderia without calling upon you for a single shilling. I have often said here, and I believe the shareholders generally agree with me, that as we had power enough in a single cable to carry our work, we should postpone the laying of a second cable as long as we could, because directly it is laid it begins to deteriorate. Those laid down recently are not of the same character as those laid at an earlier period. In the Anglo-American Company, of which I am chairman, we have this year picked up a cable that has been thirteen years in the water, in over 2,000 fathoms of water, repaired it, and it is now practically doing better work since it was first laid down. That is a piece of consolatory evidence for all who have money in submarine cables which were laid down at a much more recent date. With reference to this new cable laid down, our electrician reported, in the month of May, that a serious fault had developed itself in the Lisbon-Madeira section, and that if we attempted to repair that fault, having only one line, we should have to suspend our traffic between these two places for a certain period. In order to localise the fault—to ascertain where it actually is—you must apply such an amount of electric force to the cable as to run the risk of breaking it down altogether. Having the money in hand, your board came to the conclusion that under all the circumstances, the best thing they could do was to lay down first a new cable between Lisbon and Madeira, and then proceed to repair the old one. We did this unwillingly, because we were not willing to do that so long as we could put it off. I think you will say we were wise in taking that course, which did not require us to suspend our operations, and we could continue them without any break whatever. We have now a duplicate line between Lisbon and Madeira; and we still adhere to the policy of postponing duplicating as long as we can. We shall not do so until the necessity arises, although we may have the money in hand. The reserve fund, after paying for the new Madeira cable, now amounts to £354,000; and the effect of that upon the value of your property is apparent if you look into the newspapers. Your £10 shares for a long time hung between £7 and £8; they are now between £12 and £13; your capital, after having received 5 per cent. on it, is now 25 per cent. more valuable than at the beginning of the transaction. I think, without egotism, that you may congratulate yourselves upon the management of the concern, and upon such a result. We shall pursue the same policy as we have hitherto adopted, while laying by a sufficient sum to meet any demand for the purposes of renewal, to give every shilling beyond that to the shareholders, in the way of dividend. I think we can see, at some little distance, if we are blessed with the same immunity from disaster and accident in the future as we have enjoyed in the past—I think I can see the time when we may suspend any further additions to the renewal fund, and divide the whole of the receipts of the company in dividends amongst the shareholders. No one will rejoice more than I will when that time arrives, when the operation can be performed with due regard to the permanence and well doing of your plant and work. I will now move that the report and accounts of the directors of the 30th of June, now submitted, be approved and adopted, and that a final dividend of 3s. per share, making, with the interim dividend, a total dividend of 6 per cent. for the year ended 30th June; and also the payment of a bonus of 2s. per share in respect of profits on the year ending the 30th June, both to be free of income-tax, be declared.

Sir James Anderson seconded the motion.

Mr. Newton asked if the New York and West Coast Cable was likely to interfere with this company in any degree; and whether they would be able to meet that competition if any should arise, and whether the Chairman would tell the shareholders anything as to the business capabilities of the Hon. William St. John Brodrick, M.P., the new director?

Mr. Griffiths said he was sure the report which had been presented, and the remarks made upon it by the Chairman, must commend themselves to all persons of judicious mind. There was, however, one point to which he could not help turning his attention. They had been told there was a fault existing for many years, and repaired without duplication. Might not the Lisbon and Maderia cable have been repaired without duplication? The cables have worked well with their fault. No one can contemplate without a feeling of dismay, what would be the consequence to their business if the whole of their business were suspended. Of course if the opinion of their electrician was that it could not be repaired—

The Chairman said they must all be aware that a fault in a cable was a question of degree, and they were entirely in the hands of their electricians. Last May they were informed of the fault alluded to, which was of a grave nature—that the cable might give out at any moment. He would ask any man in his senses whether that was not the wisest thing to do—to lay down a new cable. The only answer he could give was, the probability of the cable giving out, and if they had had to suspend operations for four or five months during the winter, when they could not easily repair it, the thing spoke for itself. With regard to Mr. Newton's questions, the articles of association left the selection of a director, in case of a vacancy, to the board. He believed the new director would be as useful a member of the board as any other gentleman upon it.

Mr. Houston said as they had £50,000 to the reserve fund and had also a large sum of accumulated dividends, he thought in those circumstances he should receive another per cent. dividend, and still put a very good proportion to the reserve fund in comparison with their capital, when he looked to other companies in which he was a shareholder. He was not going to make an amendment, but he would leave it to the good sense of the board to take that matter into consideration in the future. The Eastern, with a capital of five millions, put £75,000 to the reserve fund last year; the Anglo, with a capital of seven millions, put £150,000. And supposing this company had put £37,000 of the revenue to the reserve fund, they would have been able to make it £50,000 with the accumulated dividends. He asked the board to try and give them a little more dividend in the future. Hopes had been held out for some years——

The Chairman: And realised (laughter).

Mr. Houston said with respect to the cost of the section, £100,000, which was laid by the Telegraph Construction and Maintenance Company, he heard that other companies did not get a chance of doing any work for this company. There were the India-Rubber Company and Siemens' Company. He thought the chairman said they would never duplicate the cable without bringing the matter before the shareholders.

The Chairman: No, no.

Mr. Newton said he had seen a circular to the effect that this company was making reductions. He thought if that were not so they should not be made the dupes of stockbrokers. It seemed to him that there was no fear of this company being interfered with by competition.

The Chairman said: Questions of competition had not yet arisen. The shareholders might be sure that the directors had not forgotten the chance of competition, or of the measures which it might be necessary to take in order to meet it. The board had considered the subject, and were considering it, and would do what was best in their judgment to meet the competition. With reference to Mr. Houston, who said, that judging by his experience of other companies with which he was connected, he had expected larger dividends than he was paid there, he (the chairman) was connected with some other companies, and he felt rather inclined to ask Mr. Houston, after the meeting was over, for a private interview; for he protested he did not know where such companies existed as he spoke of. It would be very satisfactory to himself and his friends, as investors, if they could find out those companies which were in such a flourishing condition (laughter). It would be very desirable to give 8 or 9 or 10 per cent., if they could do so with safety to the company. Mr. Houston would remember that that subject was introduced before, and he told him it would be studied in the future. They were endeavouring, consistently with paying what he ventured to call a large dividend, to build up a fund which would render their property safe, and when the time arrived in which, in the judgment of the board, it was not necessary to further add to it, they would divide every shilling of it. They must allow to them as directors, if they were to be directors, some judgment in the matter. With reference to the cable being repaired by the Telegraph Construction Company instead of by any other, he might say that they did not take their cable into the market and offer it for public tender, but they took a means of ascertaining what it ought to be done for, without going into the market for a public tender. They had had a great many dealings with the Telegraph Construction, and they never had one with them but what was satisfactory. He thought that when they had a man who served them well, and did work well and cheaply, it was wrong to leave him.

Mr. Newman said that having put down that cable he supposed it was a spare cable. He would like to know whether the expense of a cable now was greater than when theirs was first laid down? In the course of a somewhat rambling speech, during which there were cries of "Time," Mr. Newman said that the chairman had said he saw the time when he hoped all their receipts would be divided. Mr. Newman hoped that would not be another ten years (laughter). Nine years of their twenty years had expired. He thought they ought to have at the balance of their reserve fund such a sum as would give a dividend of 2½ per cent. to the shareholders, leaving 2½ per cent. to be received from the receipts from the cables. If they did not take some care at the end of their time their shares would not be at £13 as they were now. He thought they should be able to lay down a second cable if necessary.

Mr. Griffith remarked that some of the companies leased their cables, one condition being that the company which erected them should keep them in order. If that were done by this company he thought they would be able to have a smaller reserve fund. If such a plan could be adopted with the Telegraph Construction Company it would remove all those questions about the renewal fund.

The Chairman thought that burning question was nearly extinguished. He thought a good reserve fund was the best means that they could adopt of meeting expense.

He also said the new cable was not a spare cable; it had been made and paid for by the shareholders. With regard to the price of cables, they were now cheaper than originally. As regarded the division of profits and the use of a reserve fund, he had been all through a zealot for reserve funds. Mr. Newman suggested making up their dividend by the interest on the money when competition arose. He (the Chairman) thought the use of a reserve fund was to renew the plant whenever it required it. The Chairman then put the motion for the adoption of the report, which was carried.

M. C. F. dos Santos Silva (representative of the company at Lisbon) and Mr. Frederick Joule, the retiring directors, were next re-elected, on the proposition of the chairman, seconded by another director.

On the motion of Mr. Newton, the auditors to the company, Mr. Henry Derer and Mr. John Gane were re-elected auditors.

No further questions being asked,

Mr. Houston proposed a vote of thanks to the chairman, and Mr. Warren, in seconding it, remarked that he thought the chairman should introduce the *clôture* there. So many unnecessary questions were asked which had received answers previously that the meeting was made tedious thereby.

THE EASTERN ELECTRIC LIGHT AND POWER COMPANY (LIMITED).

On Tuesday, at the City Terminus Hotel, Cannon Street, the first ordinary general meeting of the shareholders of the above-named company was held under the presidency of Ernest Noel, Esq., chairman of the company.

Mr. Marshall T. Collet having read the notice convening the meeting,

The Chairman said: Gentlemen, I suppose you will take the report as read. It will hardly be necessary for me to read it to you, as it has been for some time in your hands. I will go on the grounds that it is taken as read. The report itself is a very full one, and no doubt is, to a considerable extent, the cause of the very small meeting we have to-day. If shareholders are not informed as to the state of a company they naturally come to the meeting to find out what is said; but it is evident, I think, from the very small number of gentlemen who are present to-day that the report of the directors is so full that they do not think it necessary to attend the meeting. At the same time I must confess that I am sorry that more shareholders are not present, as I should have liked to have explained to a large body of shareholders what the real position of the company is at the present moment. The accounts before you are only made up to the 30th of June, and when you think of the distance that India is from this country, and that our operations are not even confined to India, but to places like the Straits Settlements, still further off, you will understand that it will be impossible for us to bring all points before you accurately beyond a date like June 30th. Still I can tell the meeting somewhat of our position up to a considerably late period, only that would not be absolutely accurate, such as we could publish. I may say that I am of opinion—and I think it is the opinion of the board generally—that what we hoped for some time ago seems more and more likely to become true. I believe there is a very large opening for the industry in which we are engaged. I believe that we may look forward to a very successful trade in the East for lighting. Those of you who have at all followed the course of electric lighting in this country must be fully aware that there have arisen many and grave difficulties as to its application. The mere installations made for experimental purposes were perfect; nothing could be more perfect than what was seen at the Crystal Palace. But the experiment at the Crystal Palace and one which is a practical commercial success are very different things. Every one has seen the difficulties which have arisen in this country. There are very much larger difficulties in India, where the climate is different and the conditions under which you work are very different. Many appliances perfectly useful in England, or for a climate like our own country, would not do abroad, and we had to discover not only what was useful, but what was possible even, in a country under those different climatic influences. But notwithstanding all that — notwithstanding we have had to cope with all the difficulties that English electric engineers had to meet, and our own to boot, we have been making really substantial progress. We have been day by day and month by month overcoming difficulties. I do not say they are all overcome. I do not say we shall not make many and great improvements, for I fully trust we shall. We have advanced so far that we have done that in a degree, and I think we may almost take credit to ourselves beyond, perhaps, any electric lighting company; we have made distinct progress. We have sent out already to India and the East £40,000 worth of electric appliances of all sorts. I do not know whether you would like me to read out these amounts. We have sent £35,000 worth to India to the end of September. I hardly like to trouble so small a meeting with details; but we have sent £12,000 of cable, which I need hardly tell you remains intact. There was £9,000 for dynamos, £5,700 for steam-engines, £5,000 for lamps, £900 for posts, £800 for carbons, £600 for incandescent lamps, £1,200 in various other things. That roughly is the amount of goods sent out, which are at this moment as valuable as when sent out, so that our capital that has been sent forth to different parts of the world remains, though in a different shape, pounds, shillings, and pence. The chief part of that—as you would have seen from that short statement—was for arc lighting. And you may ask, why only consider arc lighting? Considering how much has been spoken of other lighting elsewhere, why only arc lighting? I will speak further on upon that subject in the words I have to say, and I think you will see that the reasons why we have commenced with arc lighting were such as were dictated by wisdom and prudence. We have, already at this moment established in India contracts for about £4,500 a year. That amount is very small compared with what it would have been had not we been interfered with latterly, unfortunately, by the Government. The Government prevented us from carrying overhead wires, the only way in which electric lighting had been carried on profitably until lately. They not only interfered with what we might have done in the future, but interfered with the successful installations which had been put up, under municipal authority, in three different towns, which were arbitrarily stopped by the Government. The Government determined that in the future all installations should be conducted by underground wires. We at once applied ourselves to that. If the Government do not see fit to alter that, which I think they will when they find that the installations we have put up have not the grave dangers attending them which some of their engineers have informed them there is, I think we shall find that there will be a considerable relaxation of the order which is at present in force. In fact, the arguments by which that order was enforced were of such a nature that it is evident a little further knowledge of electric lighting will explode that series of objections. I may, however, be allowed to express the opinion that I am personally favourably inclined towards underground wires, which would, I think, be an advantage both to the company itself and to the population. We applied ourselves diligently to that question. We have got a satisfactory contract for the municipality of Bombay, and we are doing an amount of street lighting which I think you will find it difficult to show elsewhere. With the towns of Broach and Surat we have both good contracts for two years, and they are now successfully lighted up evening by evening. The contract at Broach is at the rate of £50 per lamp, that at Surat slightly under. Both of these contracts are of a paying nature. The ones at Bombay, as they gave so many facilities, we have taken for £1,200 a year for arc lighting, which if not so paying as the later contracts is still one thoroughly satisfactory to the company. There are still other things which I look upon as more satisfactory to our operations. We have got a year's contract for the Kaiser Mill at a very remunerative price—at a fair substantial profit—one that will thoroughly pay the shareholders. The motive-power for the work, which is one of the greatest expenses, is given by the mill itself, and we have only to supply dynamos and lamps, and for that we have charged £28 17s. per lamp per year, an offer which is one that will certainly fairly remunerate us for our capital so employed. What has happened at the Kaiser Mill has already affected two other mills, who finding what we had done there are desirous of having the same advantages, and we are at this moment in communication with them, and I hope for a telegram within a day to say that with those two further mills we have an excellent contract signed. On the Bombay and Baroda railway we have had a temporary installation, showing the advantages of our system. A break having occurred on that line, we were enabled to send down a temporary installation, which enabled the engineers of the line to work by night, so that the line was soon again opened to the public, showing the great value of such an installation; and my belief is that the railway companies will find it is for their own interest to become purchasers of such an amount of plant as will always enable them to supply themselves with light in case of such contingencies. Then, again, we have just heard in the last letter from our managing director in India, we are to light up the Viceroy's camp next month, when there will be 50 of our large arc lamps to light up the Viceroy's and the different Punjab chief's camps; and as this is being done at the expense of the Government, as they are willing to pay for this, and pay us a fair remuneration, I can hardly doubt, myself, that we should find, as the result of that short installation, results as the exhibition of our industry in those parts of the country, which will be highly satisfactory to the shareholders. This is only one part of our great field of operations. Our operations have not been confined to India alone. We early started in Egypt. There were many difficulties to be overcome, and we showed an installation at Cairo waterworks, which was so satisfactory to the people there, that we were about to enter into contracts as to larger works. I need not enter into a political disquisition as to what has taken place in Egypt, neither is it my province to give an opinion as to what will be the future of Egypt, but I think I may say this, that whatever views we have of our present Government, we cannot but believe that Great Britain will not retire from Egypt until she has seen that there is a firm and established government there. If there is a firm and established government in Egypt, all that prosperity will be shared by your company. I have very little doubt myself, that with the establishment of a firm government in Egypt the Eastern Electric Light and Power Company will also find itself firmly established there. Our agent, Mr. Manuk, assures us that he has not the slightest doubt, that when we can show a proper incandescent installation as well as that which we have shown as arc lighting, that the demand will be very much and speedy. We have secured the services of a good engineer, who will very speedily proceed to Egypt, and I trust within a very short time you will see announced in the newspapers that an admirable incandescent installation is to be seen in Egypt—ah! better than that, that it is being taken up largely at profitable prices. Then, again, in Malta. We there commenced a small installation; the first one was at our own expense—rather as an advertisement, and nothing more. After a short time we had a short municipal contract, and have been lighting up the Strada Reale, at Valetta. That contract ends, I think, next month, and our agent there, Mr. Rosenbusch, informs us that there is hardly any doubt that we shall have an enlarged and more perfect contract with the municipal authorities, and also he adds that the demand for incandescent lighting (of which I am very soon going to speak) is very marked and decided. Then we have still further off than India another field which, to my mind, promises exceedingly well. First of all we have a great advantage in the Straits Settlements in having in Mr. Walter Judd, the agent of the Eastern Electric Telegraph Company, a most admirable coadjutor, who is permitted to work part of his time for us. Without again making too many boasts, I think without hesitation I may say that we have seen our way to a good paying business in the colony of Penang. Again I repeat, as I said before—I said it to the shareholders the first time I ever met them, and I hope to keep it always steadily before them—that what we have hoped for in this company is not to make wonderful statements of what we will do, but to bring before you what we have done. You must all know that the difficulties are considerable, but I say we have overcome many of these difficulties, and we come to-day to say, though we have not done all we could wish, we have done a good year's work in establishing good contracts and in showing what *can* be done in those distant parts, giving us a good earnest of what will be in the future. As there are, of course, unremunerative expenses, I think the board may take credit to themselves that only the sum of £3,625 may be put down as unremunerative expenses, for establishing—for the work of the first year of the company. That is like money spent on a building. The building is not the trade; the trade is carried on in it. You must have a building where you can carry it on. These expenses, when you consider the distances at which we have had to act, the expenses are very small, and are really part of what we regard as capital account, to be dealt with hereafter, for the shareholders to say whether it should be spread over more or less years. It is certainly more of the nature

of capital account than of ordinary revenue. The call which was made—£1 per share—which does not come into this statement, has been well met, and the money so derived is being spent on the inauguration of our incandescent system. And now I am going to say a few words on that system, and perhaps you may say, why have you been so backward, when one has heard so much of what can be done by incandescent lighting? Why be so backward? I think a very few words will explain that. My belief—I hardly again like to speak in the name of the board, but I think I may do so—my belief is that the board consider whilst you can undoubtedly in small instalments make a most perfect show of incandescent lighting direct from the dynamo, that at all events with our system you cannot economically and commercially work it. I believe incandescent lighting cannot be worked in a profitable manner on a large scale direct from dynamos, from the uncertainty of it. Anything happening to your engines, to your dynamos, to your shafting or any part of the machinery, and what is the result? Why, your lighting is all extinguished. In the case of a multitude of small lights the dangers of that and the expense of watching the work closely are so great that in my opinion it would not be done on a large scale commercially. We were convinced in our own system it was impossible. Therefore, storage was absolutely essential—that is to say, that you might have an amount of electricity stored up that you might turn on like water or gas whenever you wanted it. This company has made admirable arrangements with the Indian and Oriental Storage Company which gives us the use of their batteries at the cheapest rate throughout the whole field of our operations. And what does that mean? It means now that we can send out—nay, we have sent out—one of the most perfect installations of incandescent lighting that is to be seen in the world. I believe that that installation, which is now on its way to India, will prove to be ahead of almost anything that has been shown yet. Not that the Storage Company is not showing it. We are only using what they have accomplished. You may see it at their offices at work, and at our own offices, and if any shareholder has not seen the incandescent system in work I ask him to go to our offices and see it, where we have a beautiful and brilliant light. We have now sent out a perfect installation; we shall have more speedily to follow. We are prepared within a very few weeks to send out a good installation to Egypt; we hope very soon—I believe within a very few weeks—to be able to despatch one to Penang, and are looking forward to send one to Malta. Mr. Grindell, our chief electric engineer, starts to-morrow for India. He will superintend the putting up of this installation. Happily, we have such confidence in him that we have not the slightest fear but that that installation will be thoroughly satisfactory both to the people of Bombay as well as to the shareholders of this company One of the greatest difficulties we have had to contend with has been the want of men competent to undertake such work as we have for them to do in those distant countries. I am happy to say we are day by day overcoming that difficulty. More than that, we are going forward. We have in Mr. Grindell a first-rate man; we have others coming forward, and I hope before I have the honour of meeting you next year, we shall be able to say we have a first-rate staff working in the whole of our great Eastern empire. Now I do not wish to boast or to draw over-coloured statements of what we are going to do. I have tried to tell you simply what we have done and what that suggests to me. I believe there is a good future for this company. I believe there is a great future for electric lighting in the East, and I believe the lighting is peculiarly suited to those countries. I believe we have got hold of a system which will secure to us a large portion of this great industry of electric lighting throughout the Eastern world. What we have done is not what we had hoped, because the Government has so seriously interfered with our working in regard to the underground wires. Our managing director tells us that our contracts would have been more than doubled if it had not been for that interference—say ten thousand pounds. Contracts are coming in daily to us, and the demand for incandescent light is such that our agents, through our managing director, tell us that when we can show a really good installation, such as we now can show, that the demands will be more than we can at once carry out. I can only, therefore, say that in my opinion the shareholders of this company have to be congratulated on, what appears to me, a very hopeful prospect. How rapid our progress will be it is not for me to say; what difficulties remain to be overcome I cannot know; but we are determined to face them, and I believe our past experience gives us a right to hope that we shall overcome them all successfully, and be able to show that you were wise in embarking your capital in an undertaking of this kind. I beg now to move the adoption of the report; and I shall be glad to answer any questions which gentlemen may wish to ask.

Mr. Delmege asked whether any progress had been made in regard to electric lighting at Calcutta.

The Chairman said that at this moment they were in communication with a firm there. They had sent dynamos out and lamps, but they were anxious not to commence at Calcutta till they commenced arc and incandescent lighting together, because they believed that incandescent lighting would be chiefly demanded, and they would like to have a complete installation when it was made. He hoped the shareholders would shortly be informed that it had been commenced.

Mr. Delmege said he understood the company had an agent at Ceylon. He came from Ceylon, and he had heard that the company were likely to make a favourable contract there.

The Chairman said it was difficult to speak about things which were in progress. He should not like to speak of anything they were doing in Ceylon, except that they were working there. He must not say anything that would be "injurious to the public interests," as was said in parliamentary language.

Mr. Latimer Clark seconded the motion for the adoption of the report. He concurred in the chairman's remarks, and he could wish that the chairman had spoken even more strongly of the action of the Government in regard to the laying of wires underground. Difficulties were cast in the way of the companies somewhat indiscriminately, and he thought that if they knew all that had been done in that respect, they would almost be ashamed of their countrymen. The loss had been greater to the company than had been explained.

Mr. Gillett said he understood from the chairman that so far the directors were not satisfied with the commercial success of incandescent lighting. Perhaps the impression on his mind could be entirely dissipated—perhaps also from that of others. The remark conveyed this idea to him, that although they might be satisfied with the Brush dynamo for the purposes of arc lighting, yet the board were not satisfied as to the commercial success of it for incandescent lighting. If that were so, it would be a serious thing, not only for this company, but for a number of others. He took it that as they were sending out a quantity of materials for the purpose of establishing incandescent lighting, the remark of the chairman was not to be interpreted quite as he (the speaker) had taken it. Perhaps while he was on his feet he might ask a question for the purpose of clearing the atmosphere:—Whether it was true, as one had read so much of in the papers, that litigation was in view between the several subsidiary companies as to the patents not being worth what they were supposed to be worth. Would the chairman mind telling them the position of this company with regard to those points that had been raised, more especially as to the Lane-Fox patents? He believed it had been stated that the original Brush Company sold what they did not quite possess. He never heard the name of this company as likely to be involved in any litigation—he hoped it would not be—but it might be satisfactory to all present, as well as shareholders not present, if, after the report made in the newspapers, they could hear that everything they had bargained for was perfectly satisfactory.

The Chairman said he was much obliged to Mr. Gillett for calling his attention to that matter, and was sorry he was so blundering in his exposition of incandescent lighting that any such ideas should have come upon Mr. Gillett's mind. What he said, or rather what he intended to say was this, that they were convinced that incandescent lighting direct from the dynamo would not be a commercial success. They were not going to have incandescent lighting directly from the dynamo, but from storage batteries, and through these he believed that incandescent lighting would not only be a commercial success in the whole field of their operations, but would be the very best lighting. In regard to the question asked by Mr. Gillett in reference to threatened litigation elsewhere, he could only say that about this company there could be no question of litigation. They were in a different position from that of any other company, as regarded the parent company, inasmuch as this company were absolute purchasers of the patents for India and part of the East, and were manufacturers. They were not a licensed company; they were an original company, and a manufacturing company, and they had patents. With respect to Mr. Lane-Fox's patents he was not going to give an opinion. He had no reason to doubt that they were good, but if they were not good it was no business of this company, inasmuch as in such a case the money they paid would have to be returned, because the validity of the patents was guaranteed to them.

Mr. Gillett remarked that the shareholders must feel that was very satisfactory for them all to hear, both those who were present and those who were absent. He was very much obliged to the chairman for the explanation.

The motion for the adoption of the report and balance sheet was then put and carried.

Mr. Comberbatch then proposed the re-election of the auditors, Messrs. Deloitte, Dever, Griffiths & Co.

This was seconded by Mr. Paton and carried, and the proceedings concluded.

EXTRAORDINARY MEETING.

At the close of the ordinary meeting an extraordinary meeting was convened for the purpose of passing some resolutions which were essential for Stock Exchange purposes.

The Chairman said he would simply move these resolutions *pro forma*. The first was: Resolved, that articles 171 and 173 be rescinded. He explained that those articles had been objected to by the Stock Exchange, who required that they should be expunged.

The articles were read by the secretary.

Mr. Alderman McArthur, M.P., seconded the resolution.

Mr. Gillett asked for what reason the articles were originally thus drawn?

The chairman explained that at that time it was a standard form usually observed. Articles of association were all alike for most companies. Carried.

The next alteration proposed was to vary article 7, by inserting therein after the word "directors" in line one, the words "and persons thereunto expressly authorised by the board, and acting within the limits of the authority conferred on them by the board."

Mr. McArthur seconded the proposal, and it was adopted

Another alteration proposed was the addition to article 114 of the following words: "No director or officer of the company shall be appointed auditor." Carried.

Next it was proposed to add an article, No. 95a, thus: "Any resolution in writing, signed by all the directors, shall be as valid and effectual as a resolution of the board."

The chairman explained that this was to meet the emergency of being unable to form a quorum when the board were a long way from town, say, in the Autumn; then, if there was any important work necessary to be done, without summoning gentlemen from long distances, a written resolution would be sent round, and when it had been signed by the whole board that might take the place of a board meeting.

This was seconded by Gen. H. D. Abbott, C.B., and adopted.

A vote of thanks to the chairman, proposed by Mr. Gillett, and unanimously adopted, brought the meeting to a close.

THE J. B. ROGERS' ELECTRIC LIGHT AND POWER COMPANY (LIMITED).

THE general meeting of this company was held on Tuesday, October 24th, at the offices, 47, Holborn Viaduct, Captain Arthur in the chair.

The Secretary (Mr. F. Wisdom) having read the notice convening the meeting,

The Chairman: Gentlemen, I regret our chairman, Lord Graves, who came to London yesterday in order to be present to-day, through illness is unable to attend. As you are most of you doubtless aware, this is a merely formal meeting, rendered necessary by the Companies Act, and as it is held at so very recent a date after the allotment of shares, you will hardly expect from me a lengthy statement of what we have done. Our first steps have been directed to ascertaining the best means of conducting the business of the company, so as to insure the success we all feel sure awaits its operation, and in that direction our efforts are still tending. Unlike most other electric companies, instead of devoting our time to financial projects, our energies are directed to preparing means to enable us to proceed immediately to the promotion of practical electric lighting, and we are now in a position to undertake contracts for such purpose. We purpose at the termination of the lease of these premises to remove to others less expensive, but better adapted to manufacturing purposes, as we are of opinion that from such the greatest profit will accrue. We are in negotiation for several contracts, of which it would be indiscreet of me to mention the particulars, but we are hopeful of success in more than one instance. We have during the past month had a most successful exhibition of the light at Reading, which was a public trial of no mean order, details of which Mr. Rogers, in whose hand the whole management has been, will now give you.

Mr. Rogers: Well, the operations at Reading have extended to this: within ten hours we had 40 lights, next day we had 105, and then something like 136, and afterwards 189, giving 10 horse-power. (?) I think that is about as much as you can expect from such a trial under the circumstances. We had merely an engine on wheels, nothing fixed, and I believe it was giving great satisfaction in the place. I have since moved to the back of the Town Hall. The town authorities entertain the proposition of lighting up the Town Hall, but it must come before the Council, which meets on Tuesday, November 7th. Well, I lit up the Abbey in the first place, and the Hall, that is, the Abbey Hotel. I also lit up the Ship Hotel and the *Mercury* Office, and gave off lights in two or three shops in the neighbourhood on Saturday night. I also lit up the Queen's Hotel Banqueting Hall, where the Corporation had their annual banquet. You are quite aware this is only merely to demonstrate the fact that the light is practical, and was giving the greatest satisfaction in Reading. Another thing, I think, that is done for about one-eighth (?) per cent. less than was spent by another company in carrying, or attempting to carry, what we have in Reading. I think we are doing the best we can with the means at our command.

A Shareholder: One of our directors present, I understand, has been to Reading; he may be able to give us a few details.

Colonel Liebenrood: I do not intend to go into details, I simply want to state to you that I have been down there constantly while the experiments have been going on, as I reside in the neighbourhood. I have had facilities for hearing from various sources, either good or bad, opinions of the different people in the locality, and I can tell you that in every single instance, and I have tried in all parts, parts where I have been unknown to have any connection with the company, and I have found on all sides the highest opinions, everybody who has seen the light speaks of it as the greatest success they have ever seen connected with electric lighting. I feel quite sure it was a very severe test, because we had to distribute the light over an hotel of three flats, that is a severe test on the distribution of an electrical current, particularly as it is away from our main works and in a new field. If we succeed here I will have greater faith in the incandescent than I ever had before. At this exhibition I can say there was not a failure of any kind, and we are told that everybody in the place speaks highly of the light. One or two other companies have tried in the same field before and failed, and they put it down to a want of power. We have succeeded, and therefore we gain all the more credit in having done so.

The meeting was then made special, when the following resolution was put and carried:—That the following article be substituted for article No. 95 of the Articles of Association of the company:—"95.—Notwithstanding any of the clauses herein contained, the directors may from time to time as and when the patents and inventions of the company or any licences to use the same shall be sold or disposed of, or granted for any consideration other than the payment of annual royalties, distribute the said consideration among the members in proportion to their interests in the capital of the company (as nearly as may be), except that the deferred shareholders in case the dividend mentioned in article 86, sub sec. 1, shall have been duly paid or provided for, shall be entitled to a distribution of one-third of such consideration amongst them in the proportion aforesaid, and the preferred shareholders shall be entitled to the remaining two-thirds of such consideration for distribution amongst them in the like proportion. For the purposes of enabling such distribution to be made the directors shall be at liberty to sell or realise any part of such consideration which cannot be distributed except by means of a sale, and in the event of any of the members either declining or being unable to accept the proportion of any consideration (other than cash) to which they shall be entitled, the directors may sell or realise the same at their discretion, and pay the net proceeds to such members."

Mr. Martin Wood proposed a vote of thanks to the chairman, which was seconded and carried unanimously.

The Chairman: I thank you, gentlemen, and hope the next time we meet we may have something more to communicate to you.

The proceedings then terminated.

THE WEST COAST OF AMERICA TELEGRAPH COMPANY.—We are informed that communication by this company's cable between Lima and Mollendo was restored on the 30th ult., and that messages can now be sent through the Atlantic Cable Companies, *viâ* Galveston, direct to Valparaiso and elsewhere in Chili and the Argentine Republic.

CENTRAL AND SOUTH AMERICAN TELEGRAPH COMPANY.—Telegraphic communication with Valparaiso, Panama, Buenaventura, Payta, Lima, Mollendo, Arica, Iquique, Antofagasta, and all telegraph stations in Peru and Chili, is now established, *viâ* New York and Mexico.

THE BIRMINGHAM AND WARWICKSHIRE (BRUSH) ELECTRIC LIGHT COMPANY.—Mr. David Evans, C.C., has retired from the board of this company.

APPLICATION has been made to the Stock Exchange Committee to appoint a special settling day in the following securities:—London and Globe Telephone and Maintenance Company (Limited), shares; London and Provincial Electric Light and Power Company (Limited), shares.

QUOTATIONS.

Authorised Issue.	Share.	Name.	Paid.	Quotations. Nov. 2 1 O'clock.	Business Done.
		ELECTRIC LIGHT.			
40,000	10	Anglo-American Brush Co.	4	9¾-10¼	9⅛,8⅜,8⅜,10,9 1/16 ⅛,4⅛,4⅛,9⅛,9⅛
		Do. Do.	10	18 - 23	
30,000	5	Australasian Electric Light, Power & Storage Co.	3	1⅛- 1⅜	1⅛
24,900	10	British Insulite Co., Limited, "A" Shares	5	4⅛- 5	
30,000	5	Brush Electric Light & Power Co. (Scotland)	2½	⅛- 1⅛	
25,000	5	Great Western Electric Light & Power Co.	2½	⅛- 1⅛	1 7/16
24,989	5	Hammond Electric Light & Power Supply Co.	2½	5 -5⅛	5,1/16,⅛,4⅞
40,000	5	Indian & Oriental Electrical Storage Works Co.	2	1⅛- 1⅜	
172,500	1	Maxim-Weston Electric Light and Power Co.	1	⅛- ¼	⅛
40,000	5	Pilsen-Joel & General Electric Light Co.	2	1⅛- 2	
..	..	South African Brush Electric Light & Power Co.	2½	⅞- 1⅛	
100,000	5	Swan United Electric Light Co., Limited	2	1⅜- 2⅛	
		TELEGRAPHS.			
2,116,400*l.*	Stk.	Anglo-American, Limited	100	49½- 50⅛	49⅛
2,441,800*l.*	Stk.	Do. Preferred (Def'd. receiving no div. until)	100	80½- 81⅛	81.80⅛
2,441,800*l.*	Stk.	Do. Deferred (6 p. c. has been paid to Pref.)	100	19 - 20	
130,000	10	Brazilian Submarine, Limited	10	12 -12¼	12⅛
16,000	10	Cuba, Limited	10	9⅞- 10⅛	
6,000	10	Do. 10 per cent. Preference	10	16 - 17	
13,000	10	Direct Spanish, Limited	9	6 - 6⅛	
6,000	10	Do. 10 per cent. Preference	10	15½- 16⅛	15⅞
65,000	20	Direct United States Cable, Limited, 1877	20	11⅜- 11⅝	11⅝,12,11⅞
100,000*l.*	100	Do. 6 per cent. Debenture, repayable 1884	100	100 -103	
380,000	10	Eastern, Limited	10	10⅛-10⅜	10⅜,⅜,10⅛,⅛
70,000	10	Do. 6 per cent. Preference	10	12⅜- 13⅛	13.12 7/16
232,000*l.*	100	Do. 6 do. Debentures, repayable Oct. 1883	100	100 -103	
200,000*l.*	100	Do. 5 do. do. Aug. 1887	100	101 -104	
200,000*l.*	100	Do. 5 do. do. Aug. 1899	100	102 -105	
199,750	19	Eastern Extension, Australasia & China, Limited	10	11⅜- 11⅝	11 1/16
320,000	100	Do. 6 p. c. Debentures, repayable Feb. 1891	100	107 -110	
500,000	100	Do. 5 p. c. (Australian Gov. Subsidy) Deb. 1900	100	102 -105	
140,000	100	Do. do. registered, repayable 1900	100	102 -105	
100,000*l.*	100	Do. 5 per cent. Debenture, 1890	100	103 -106	
254,300*l.*	100	Eastern and South African Limited 5 per cent. Mort. Deb. Registered redeemable 1 Jan. 1900	100	102 -105	
345,700*l.*	100	Do. do. do. To Bearer	100	102 -105	
22,050	10	German Union Telegraph and Trust, Limited	10	9⅞- 10⅛	10⅛,9⅞
163,390	10	Globe Telegraph and Trust, Limited	10	6⅜- 6⅝	6⅜,⅝ xd.
163,209	10	Do. 6 per cent. Preference	10	12⅛- 12⅜	12⅜ xd.
125,000	10	Great Northern	10	13⅛- 13⅜	
100,000*l.*	100	Do. 5 per cent. Debentures	100	100 -103	
31,200	10	India-Rubber, Gutta-Percha and Telegraph Works	10	..	
100,000	100	Do. 6 per cent. Debentures, 1886	100	..	
17,000	25	Indo-European, Limited	25	30⅛- 31⅛	
38,148	10	London Platino-Brazilian, Limited	10	4⅛- 4⅜	
12,000	10	Mediterranean Extension, Limited	10	1⅞- 2⅛	
8,200	10	Do. 8 per cent. Preference	10	8 - 9	
9,000	8	Reuter's, Limited	8	12½- 13	
280,000	Stk.	Submarine	100	245 -255	
58,225	1	Do. Scrip	1	2⅛- 2⅜	
4,200	Cert.	Submarine Cables Trust	100	101 -105	104½
37,350	12	Telegraph Construction and Maintenance	12	33½- 34½	33¾ 4
150,000	100	Do. 6 per cent. Bonds, 1884	100	101 -104	
186,750	5	Do. 2nd Bonus Trust Cert.	5	1⅛- 1⅜	
30,000	10	West Coast of America, Limited	10	4⅛- 5⅛	
150,000	100	Do. 8 per cent. Debentures	..	..	
69,910	20	Western and Brazilian, Limited	20	7⅛- 7⅜	7 3/16
200,000*l.*	100	Do. 6 per cent. Debentures "A" 1910	100	104 -107	
2,500	100	Do. 6 p.c. Mort. Deb. series B of '80, red. Feb., 1910	100	97 -100	
1,500	$1,000	Western Union of U. S. 7 p.c. Mort. (Building) Bds.	$1,000	123 -128	
1,030,000*l.*	100	Do. 6 per cent. Sterling Bonds	100	100 -103	
88,321	10	West India and Panama, Limited	10	1⅛- 1⅜	
34,563	10	Do. 6 per cent. 1st Preference	10	7 - 7⅛	
4,669	10	Do. 6 do. 2nd do.	10	5⅞- 6⅛	
		TELEPHONES.			
154,165	1	Con. Telephone & Maintenance, Ld. Nos. 1 to 154,165	1	1 - 1⅛	1 1/16
200,000	1	Oriental Telephone Co., Nos. 100,000 to 300,000	⅛	⅛- ⅜	⅜,⅛
100,000	5	United Telephone Co.	5	10⅞- 11⅛	

TRAFFIC RECEIPTS.

The Western and Brazilian Telegraph Company (Limited). The traffic receipts for the week ending 20th October, 1882, were £2,603; and for the week ending 27th October, 1882, were £2,365, both after deducting the "fifth" of the gross receipts payable to the London Platino-Brazilian Telegraph Company (Limited).

West India and Panama Telegraph Company (Limited). The estimated traffic receipts for the half-month ended the 30th September are £1,729, as compared with £1,616 in the corresponding period of 1881. The estimated receipts for 15th October are £1,605, as compared with £1,693 in 1881.